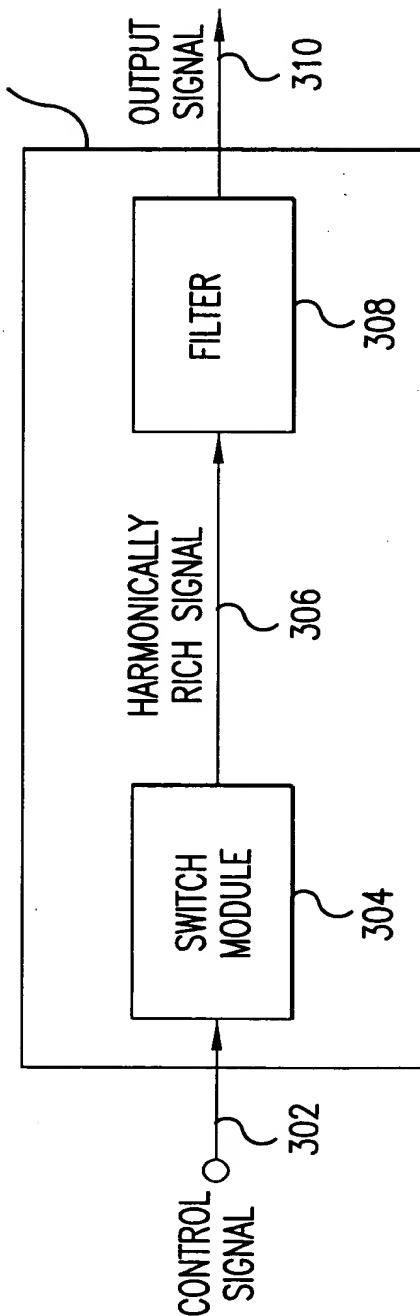


UNIVERSAL FREQUENCY  
 UP-CONVERSION  
 (UFU) MODULE 300



UNIVERSAL FREQUENCY  
 UP-CONVERSION  
 (UFU) MODULE 590

FIG. 3

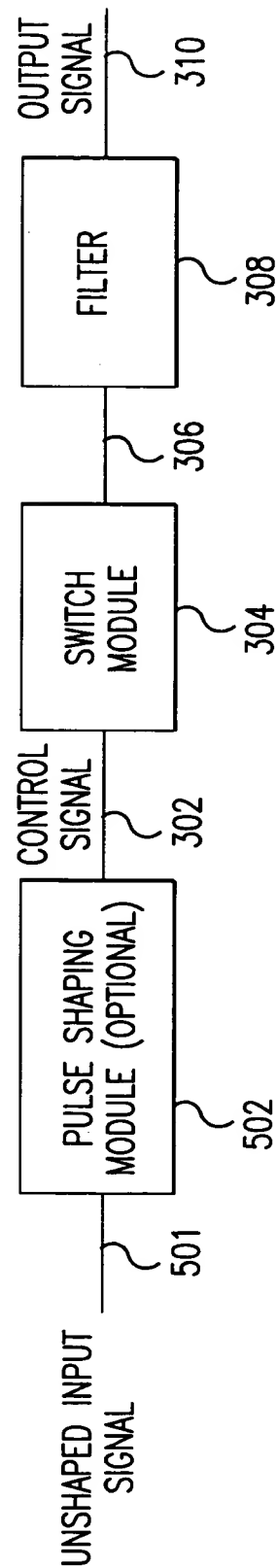


FIG. 5



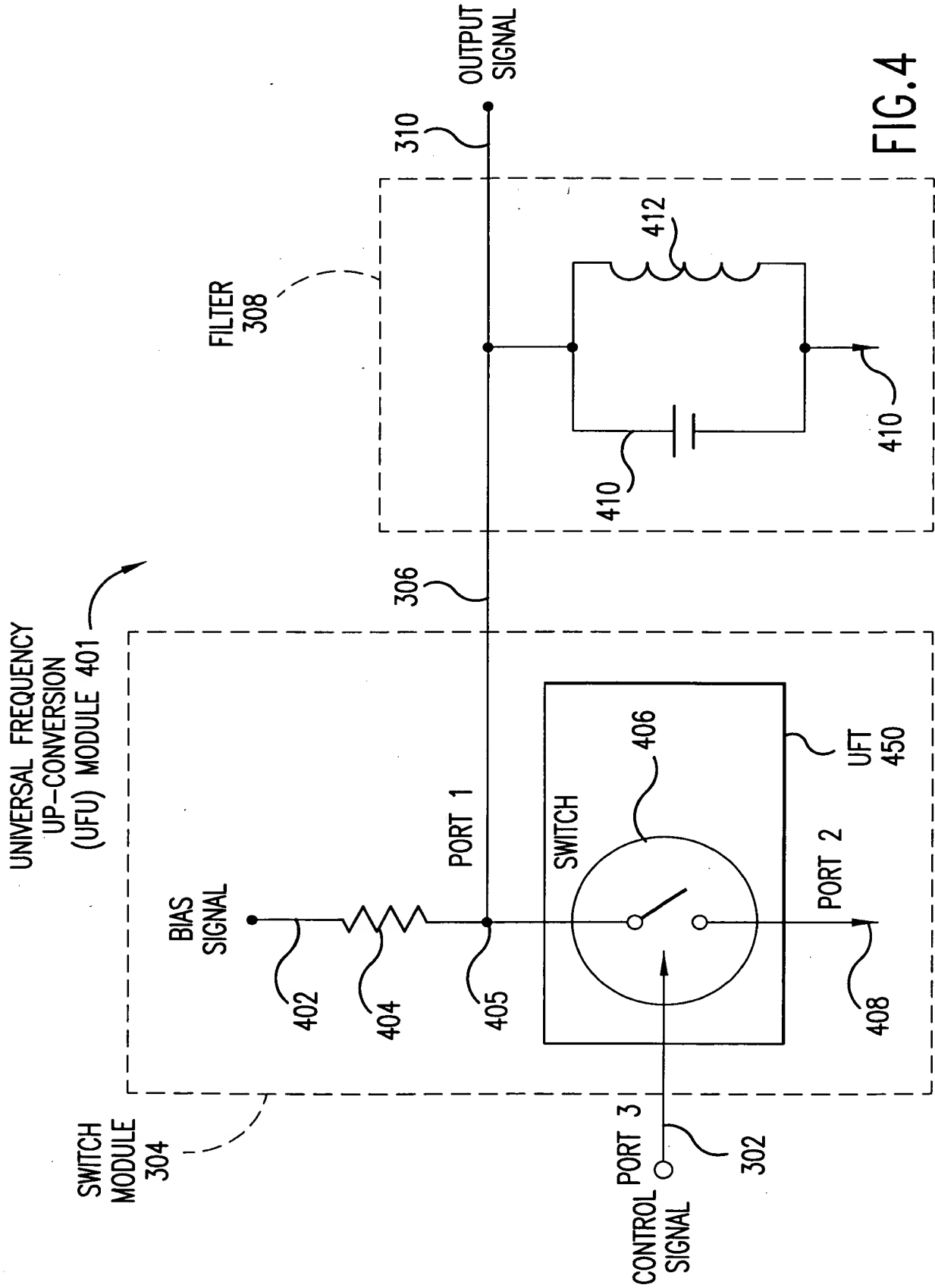


FIG. 4

INFORMATION  
SIGNAL 602

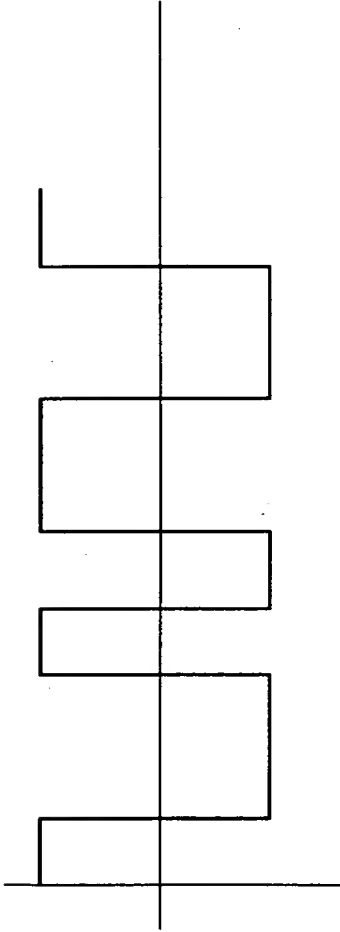


FIG. 6A

OSCILLATING  
SIGNAL 604

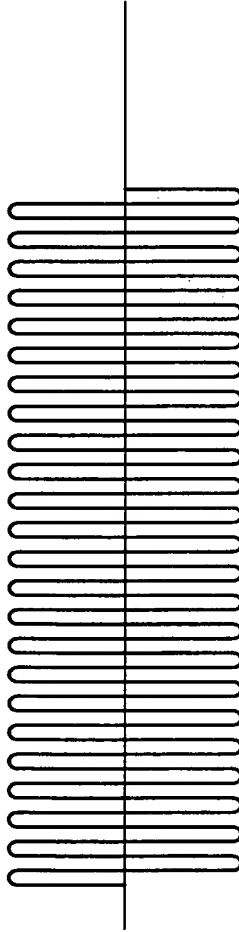


FIG. 6B

FREQUENCY MODULATED  
INPUT SIGNAL 606

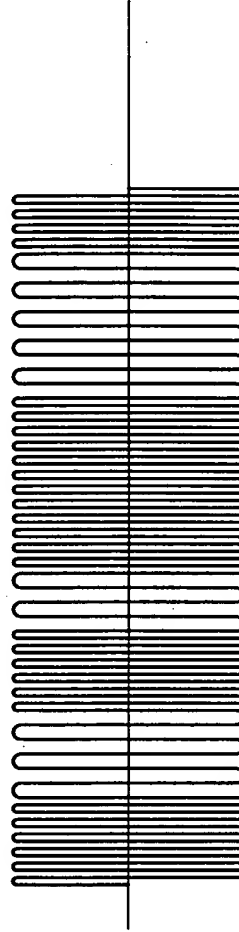


FIG. 6C

HARMONICALLY  
RICH SIGNAL  
(SHOWN AS SQUARE  
WAVE) 608



FIG. 6D

SEE FIG. 6.E

EXPANDED VIEW OF  
HARMONICALLY RICH  
SIGNAL 608

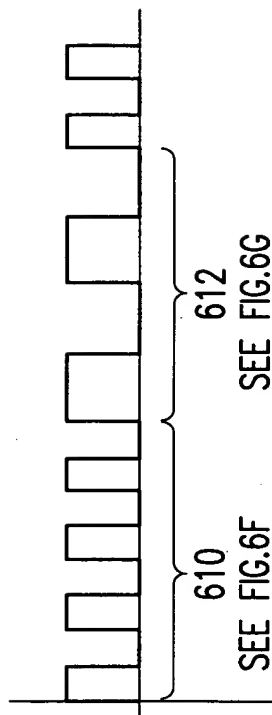


FIG. 6E

HARMONICS OF  
SIGNAL 610  
(SHOWN SEPARATELY)

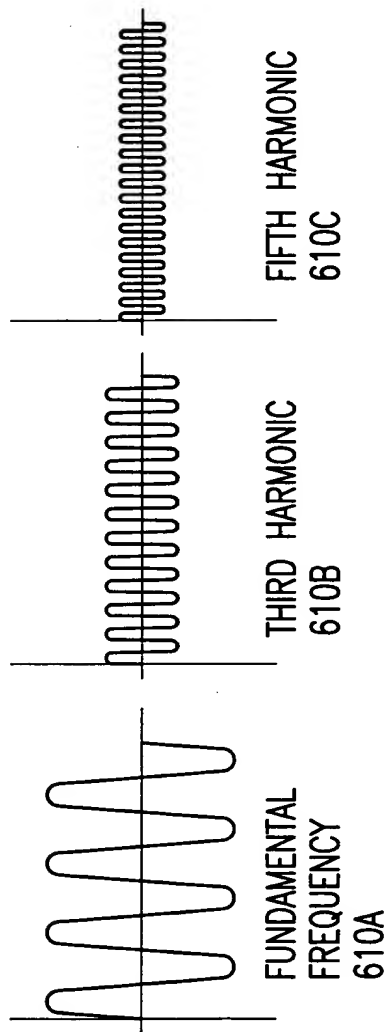


FIG. 6F

HARMONICS OF  
SIGNAL 612  
(SHOWN SEPARATELY)

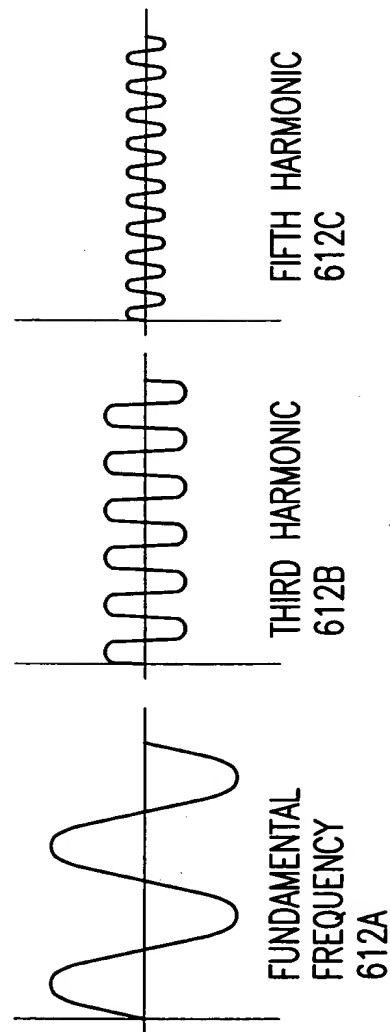
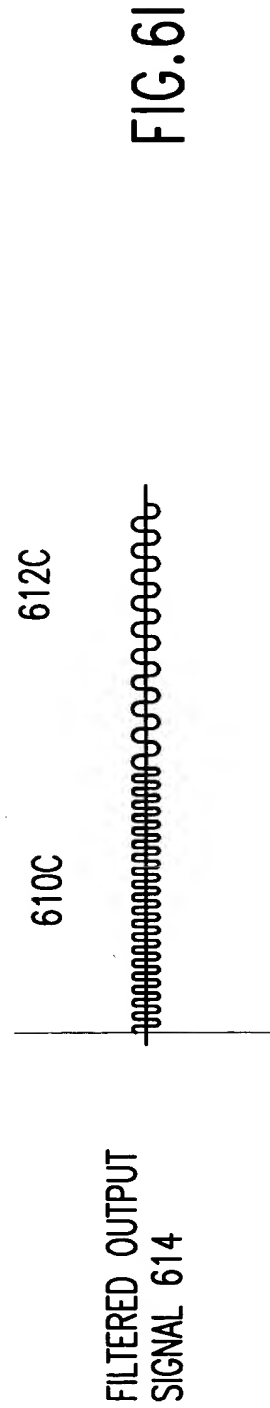
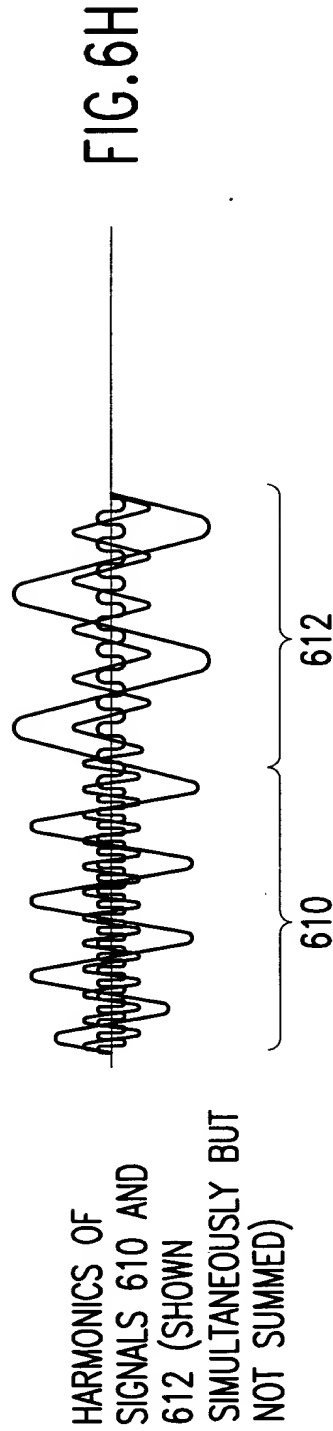
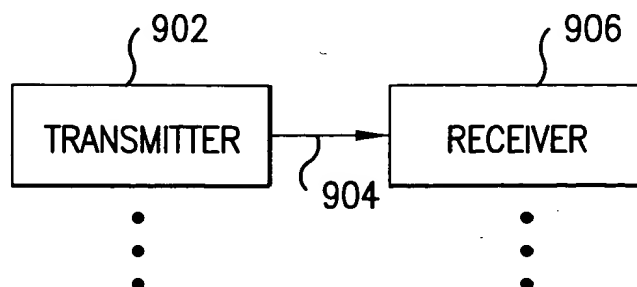
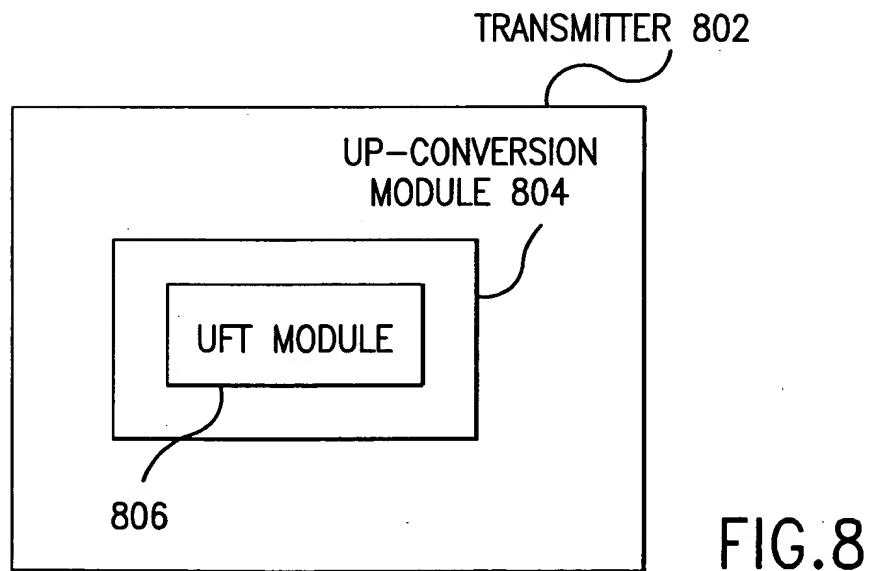
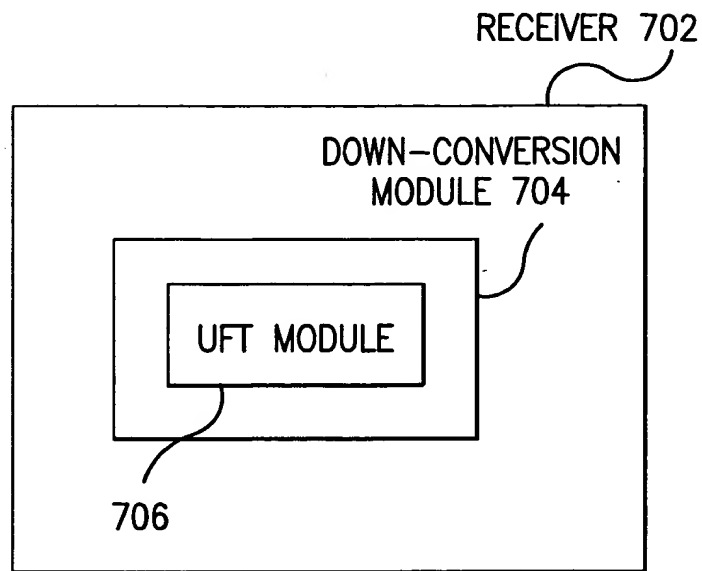
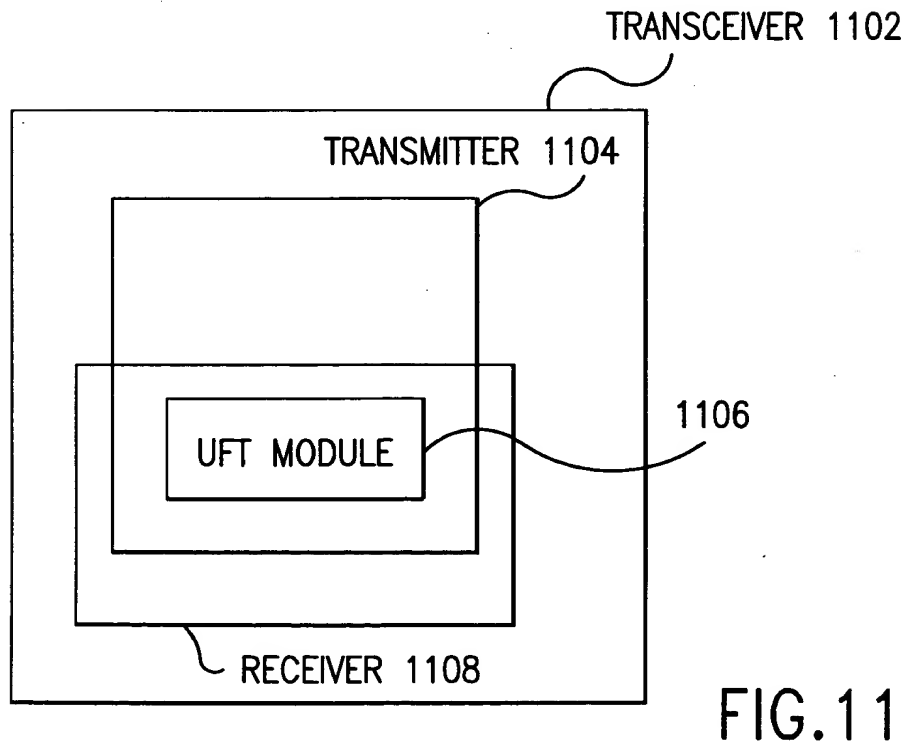
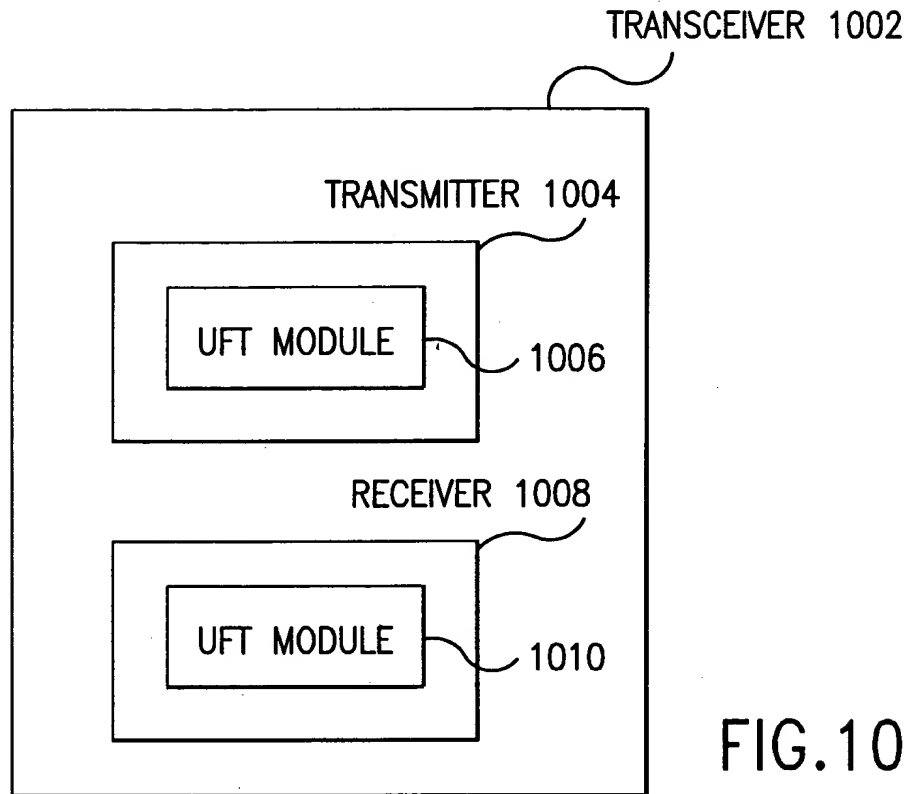


FIG. 6G







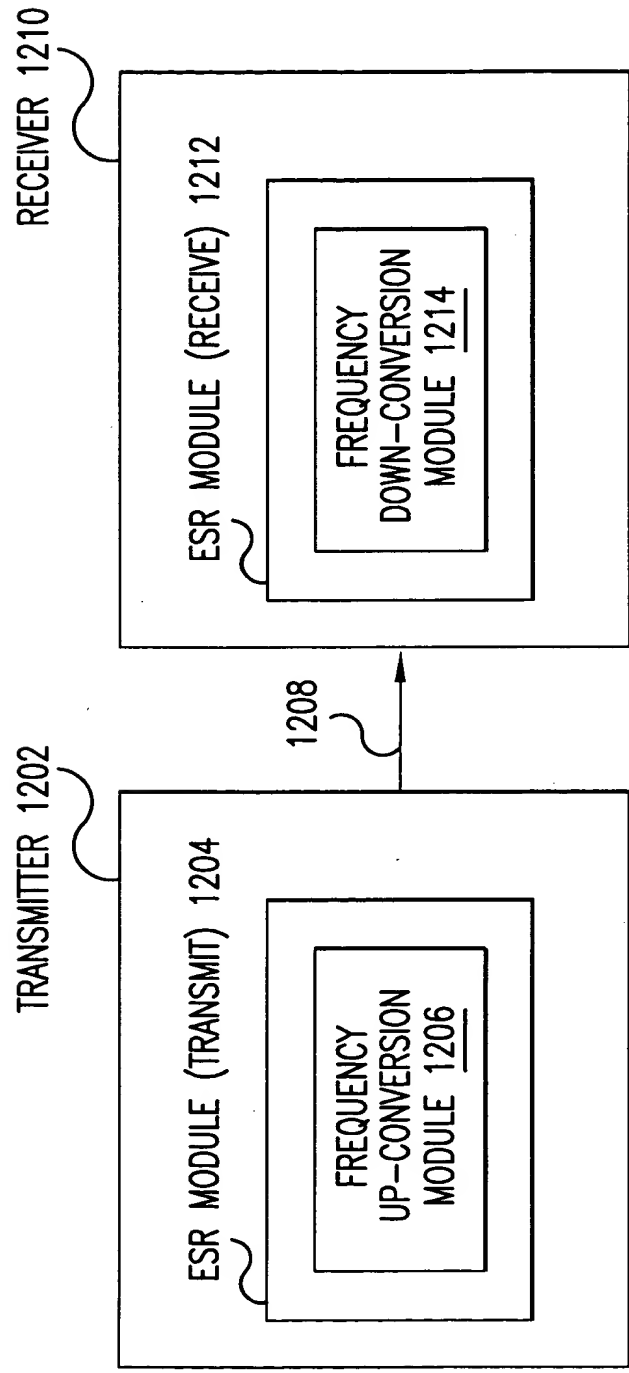


FIG.12

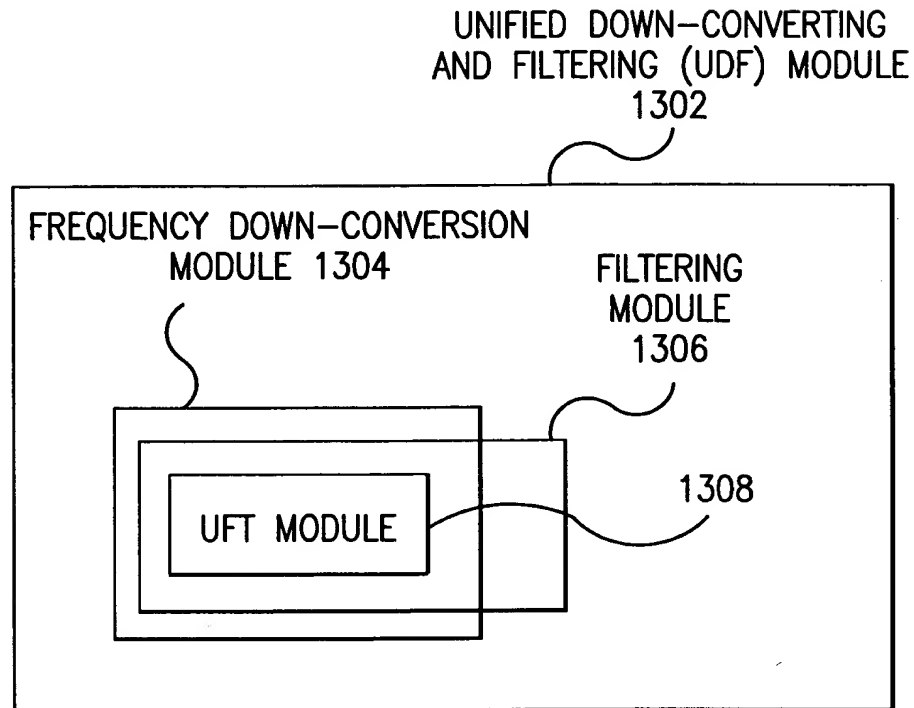


FIG.13

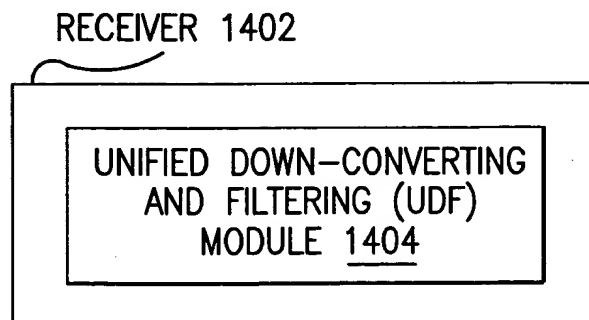


FIG.14



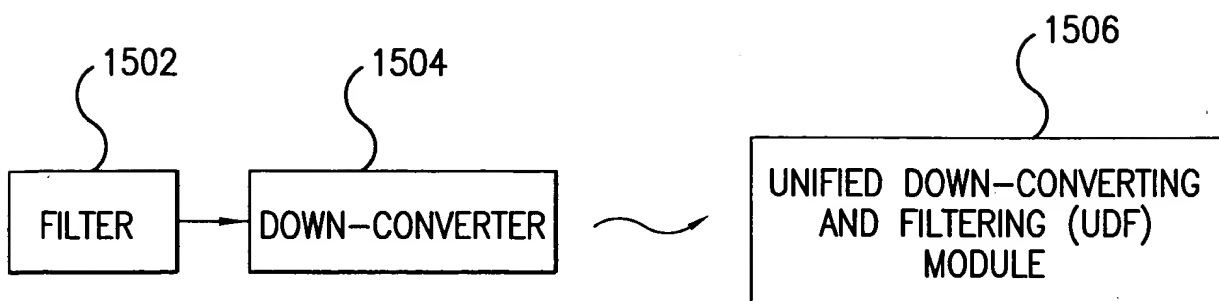


FIG.15A

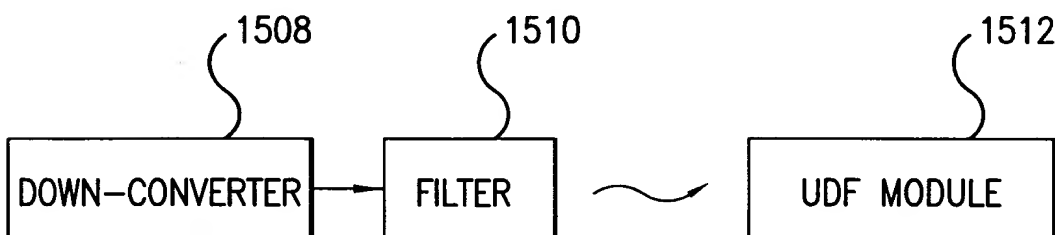


FIG.15B

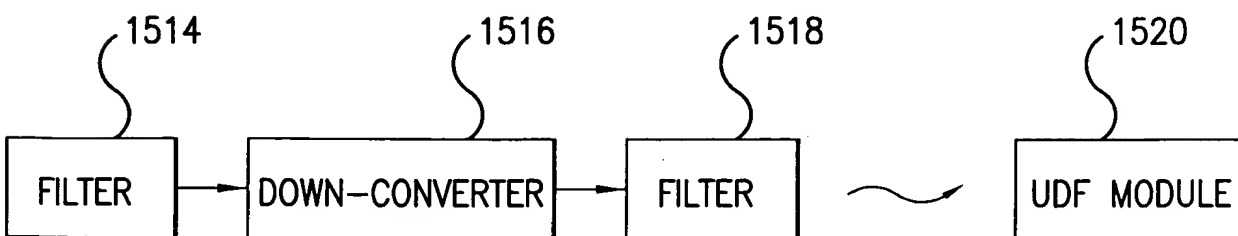


FIG.15C

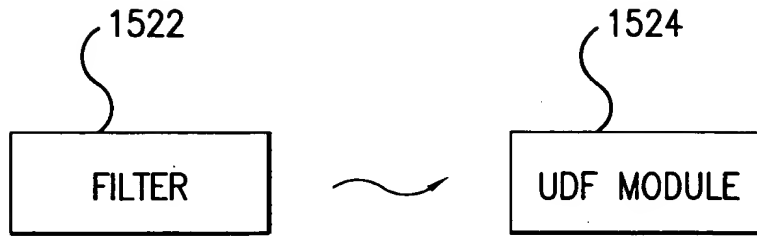


FIG.15D

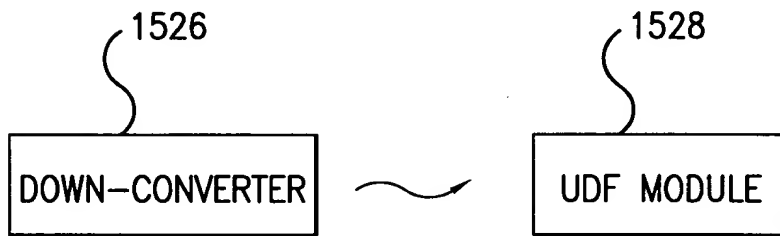


FIG.15E

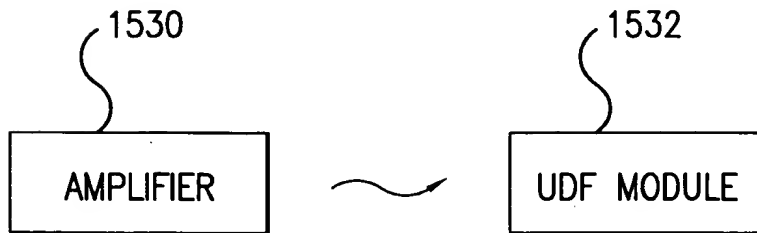


FIG.15F

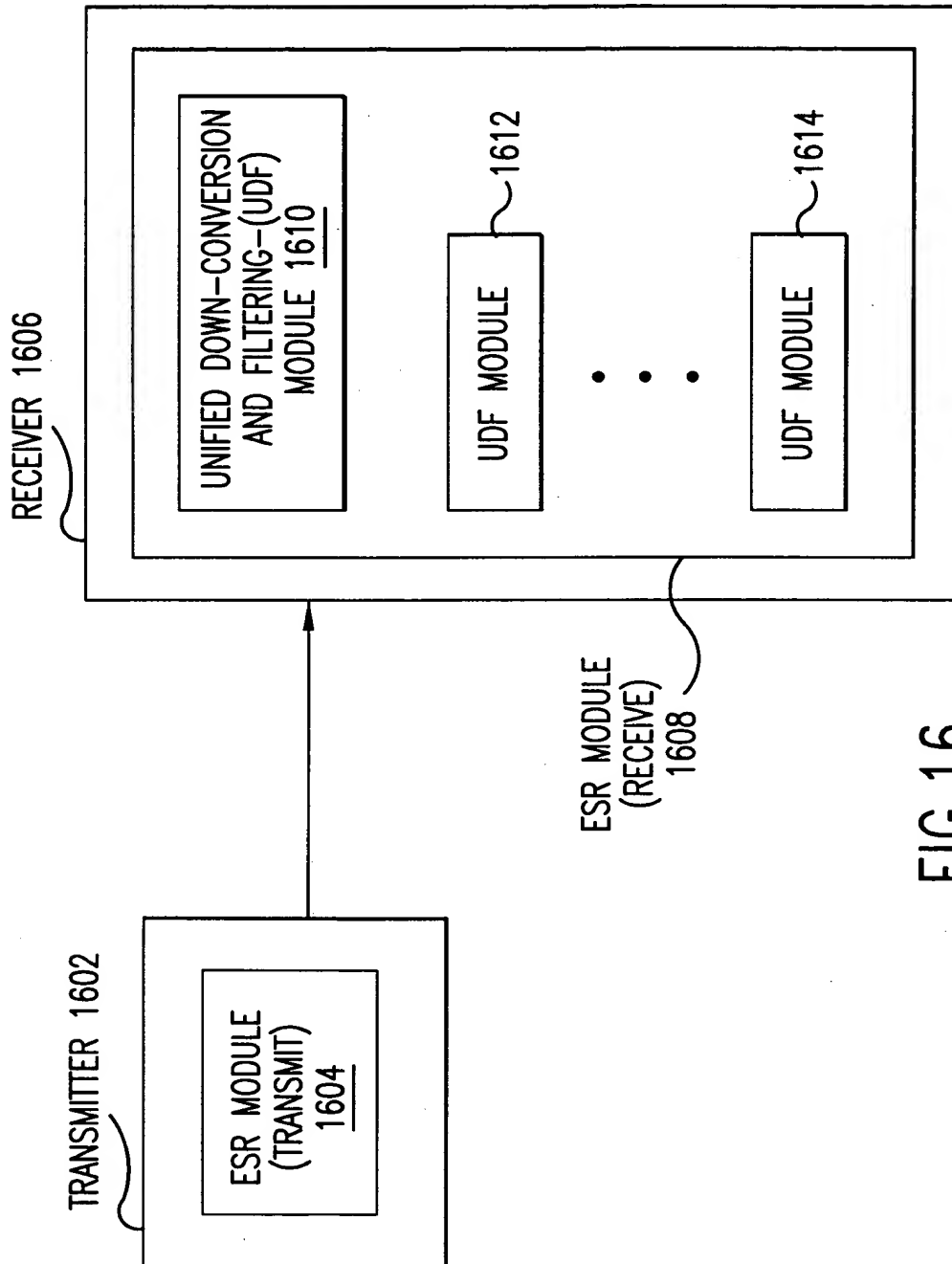


FIG. 16

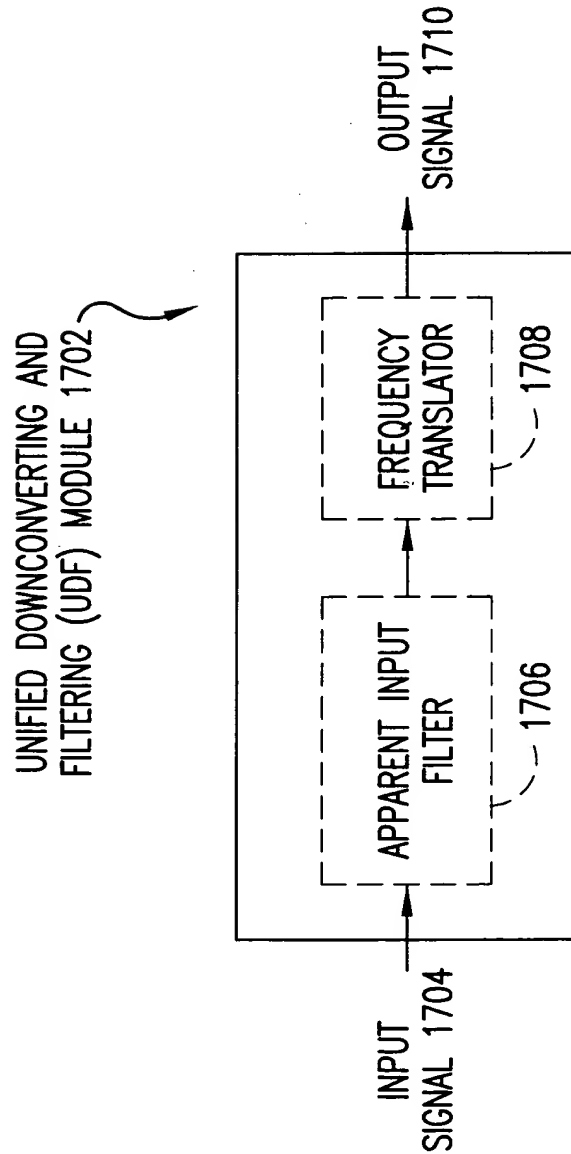


FIG.17

1802

TIME NODE	t-1 (RISING EDGE OF $\phi_1$ )	t-1 (RISING EDGE OF $\phi_2$ )	t (RISING EDGE OF $\phi_1$ )	t (RISING EDGE OF $\phi_2$ )	t+1 (RISING EDGE OF $\phi_1$ )
1902	$V_{I,t-1}$ 1804	$V_{I,t-1}$ 1808	$V_{I,t}$ 1816	$V_{I,t}$ 1826	$V_{I,t+1}$ 1838
1904	—	$V_{I,t-1}$ 1810	$V_{I,t-1}$ 1818	$V_{I,t}$ 1828	$V_{I,t}$ 1840
1906	$V_{O,t-1}$ 1806	$V_{O,t-1}$ 1812	$V_{O,t}$ 1820	$V_{O,t}$ 1830	$V_{O,t+1}$ 1842
1908	—	$V_{O,t-1}$ 1814	$V_{O,t-1}$ 1822	$V_{O,t}$ 1832	$V_{O,t}$ 1844
1910	— 1807	—	$V_{O,t-1}$ 1824	$V_{O,t-1}$ 1834	$V_{O,t}$ 1846
1912	—	— 1815	—	$V_{O,t-1}$ 1836	$V_{O,t-1}$ 1848
1918	—	—	—	—	$V_{I,t}^-$ 1850 0.1 * $V_{O,t}$ 0.8 * $V_{O,t-1}$

FIG.18

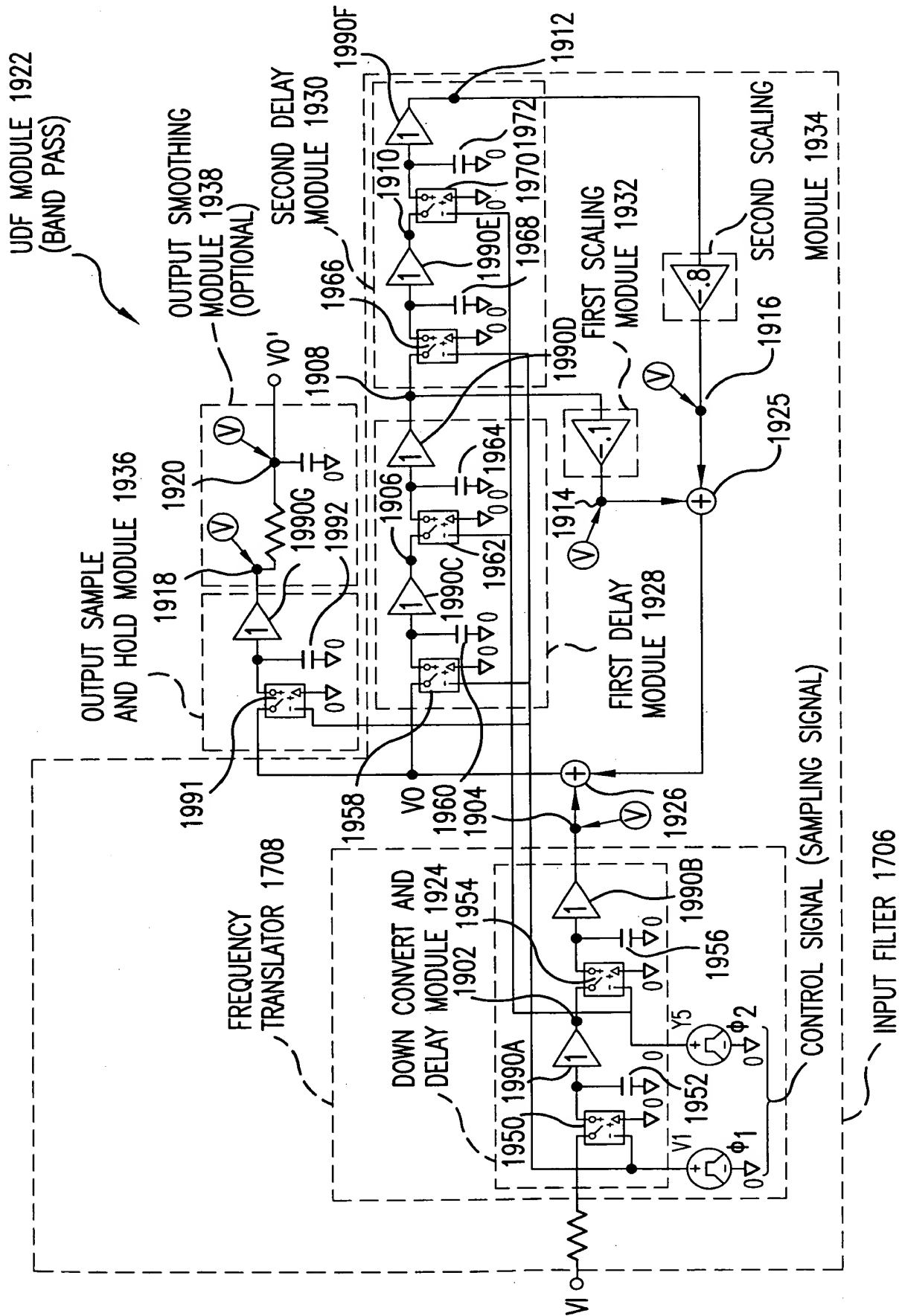


FIG. 19

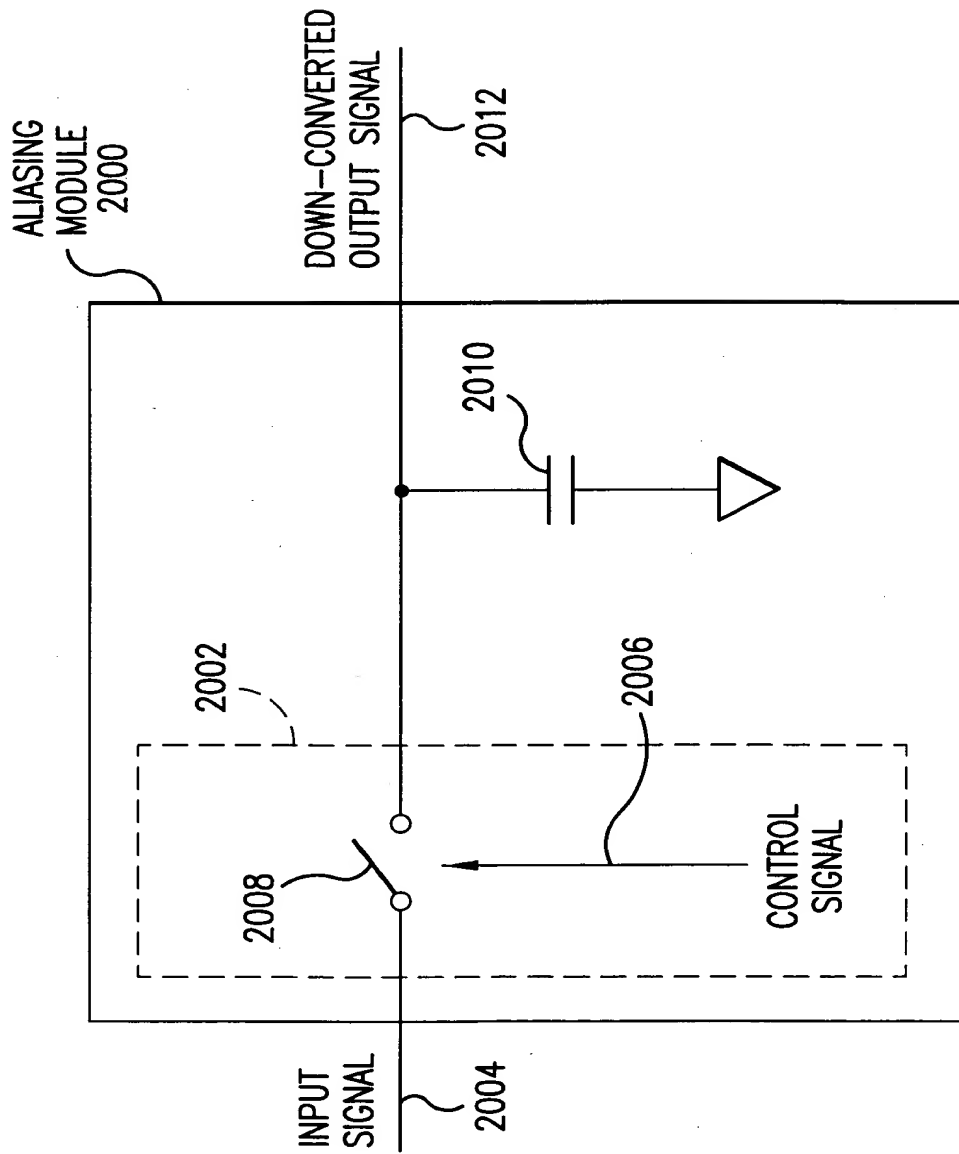


FIG. 20A

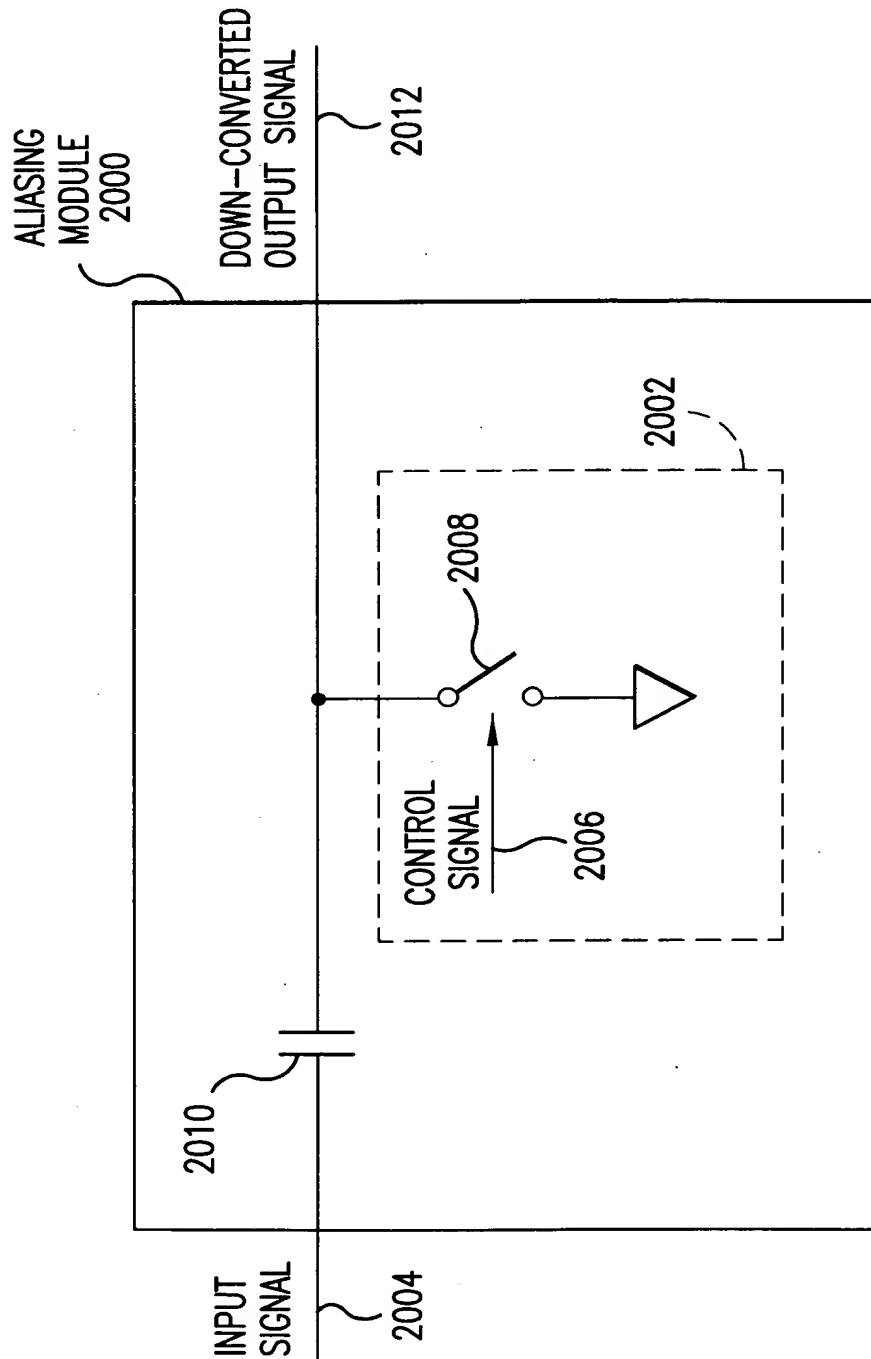


FIG. 20A-1



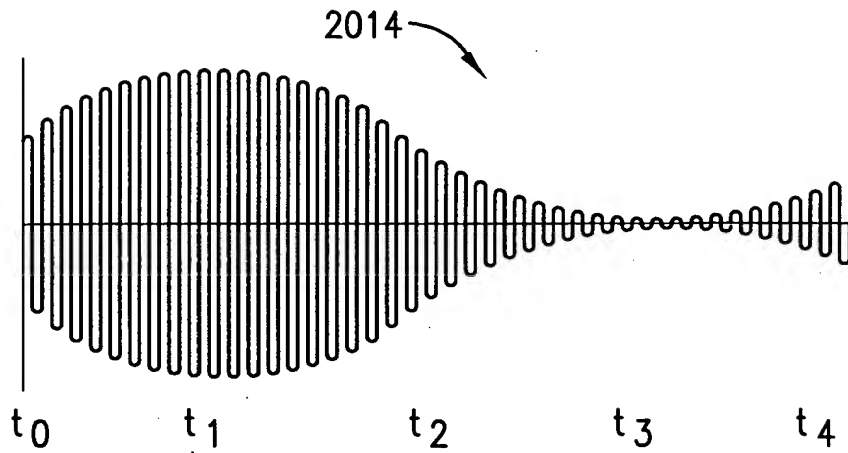


FIG. 20B

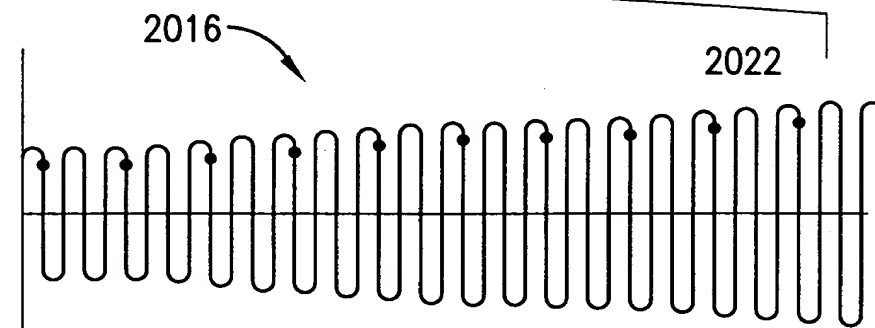


FIG. 20C

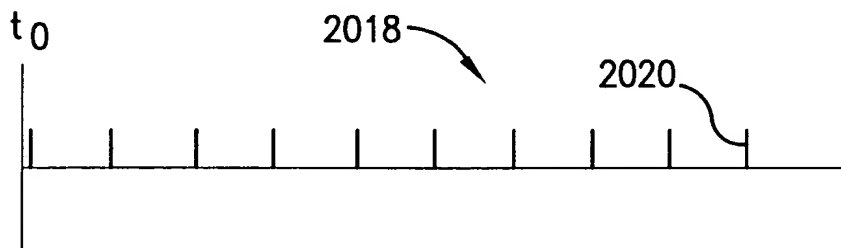


FIG. 20D

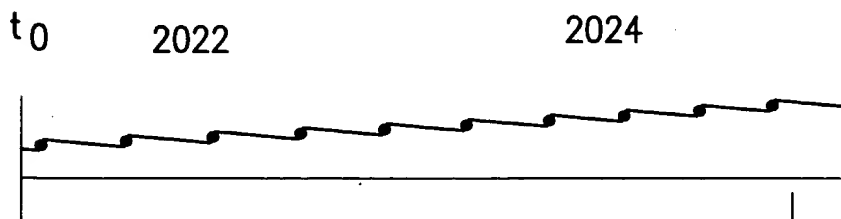
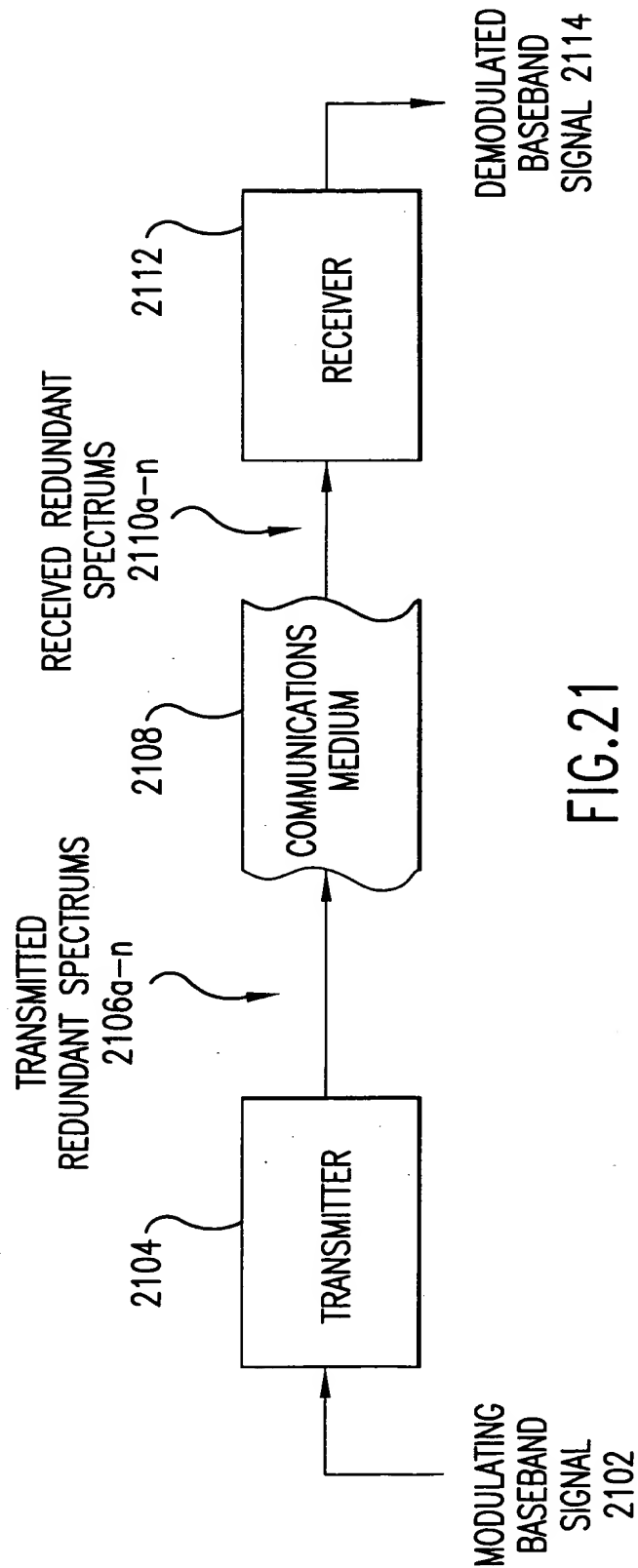


FIG. 20E



FIG. 20F



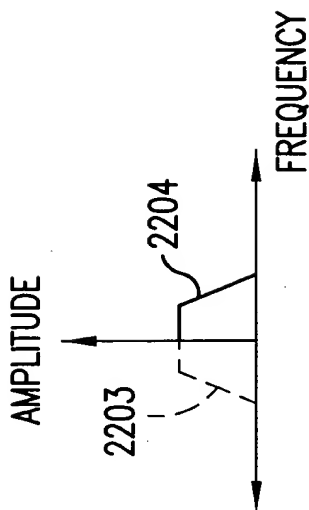


FIG. 22B

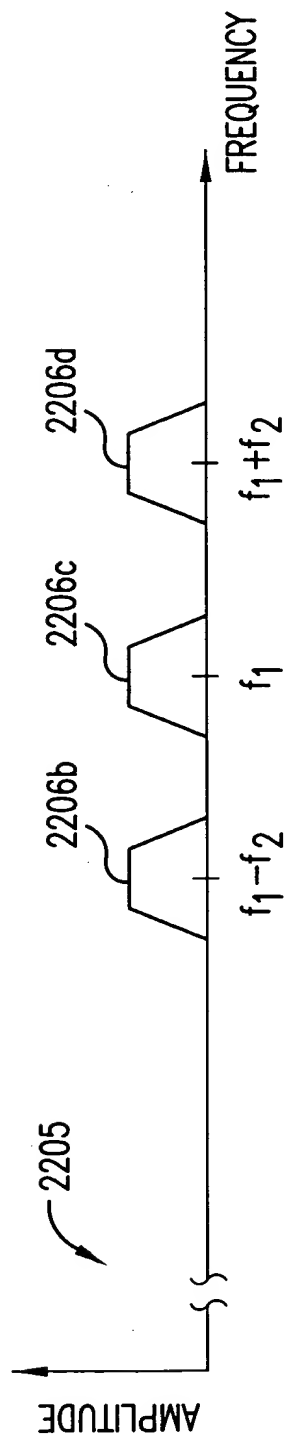


FIG. 22D

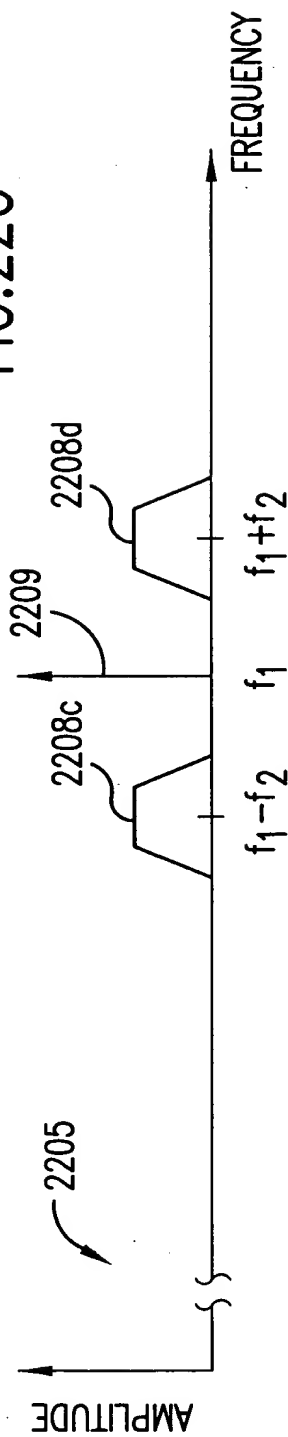
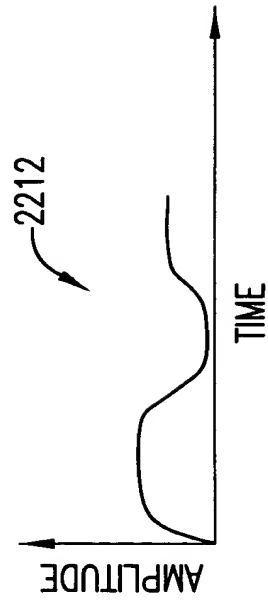
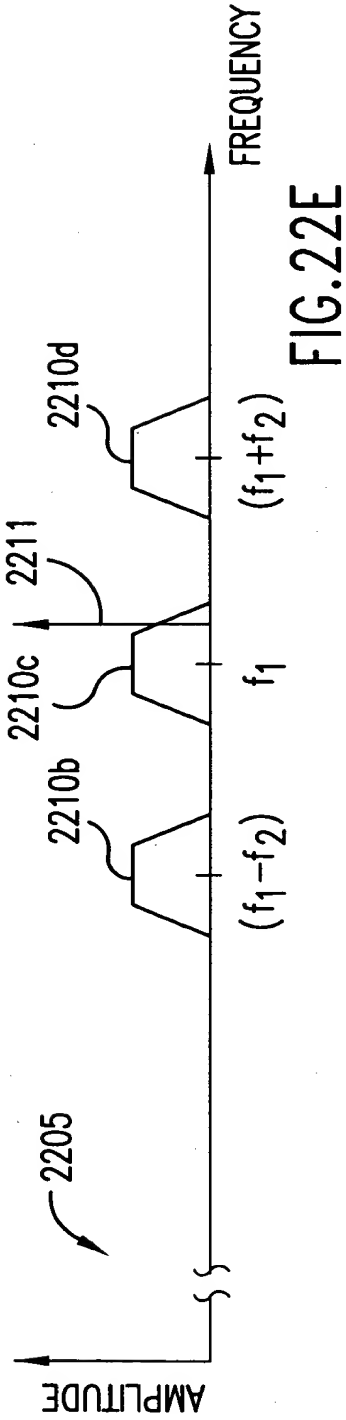


FIG. 22E



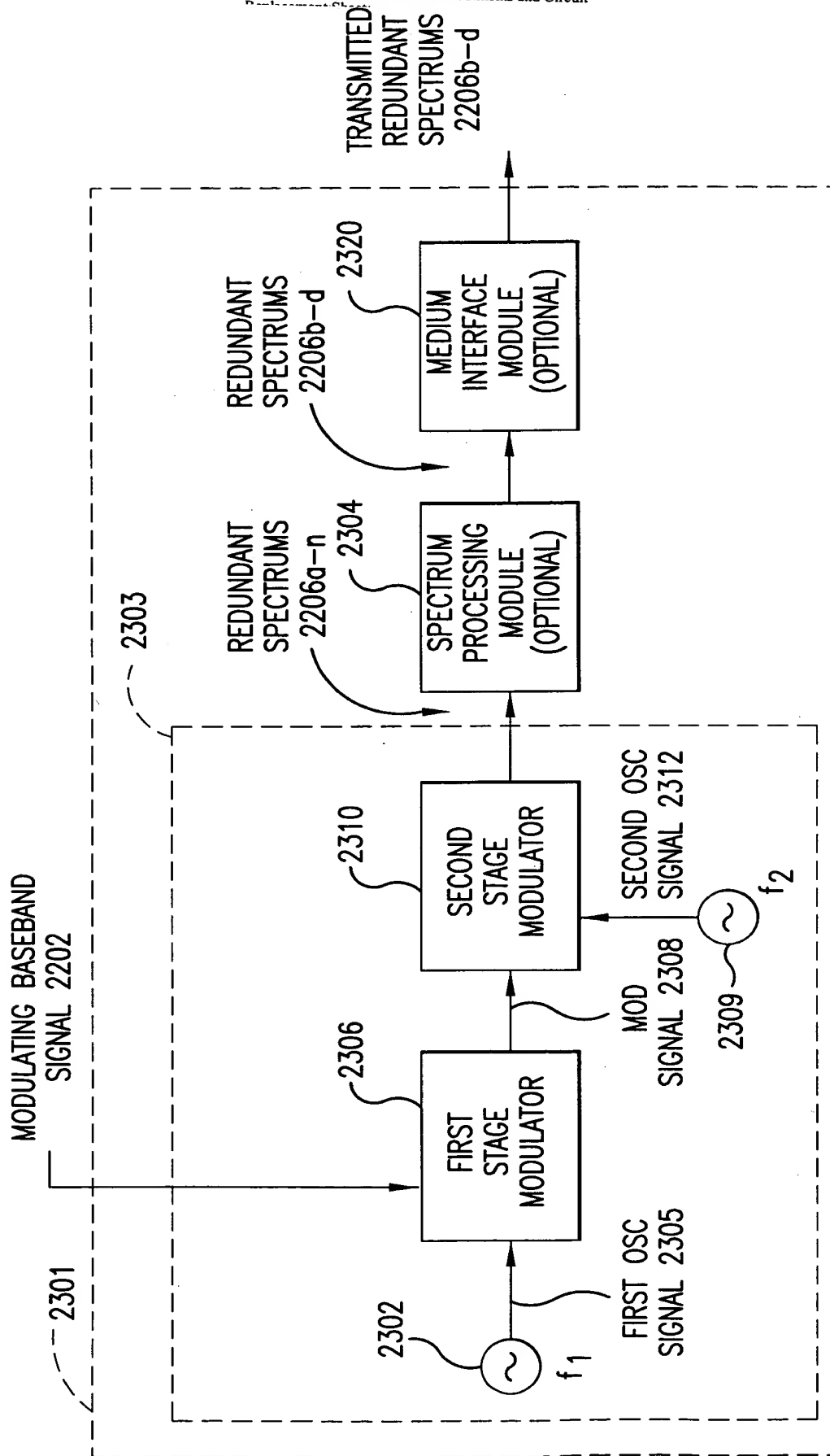
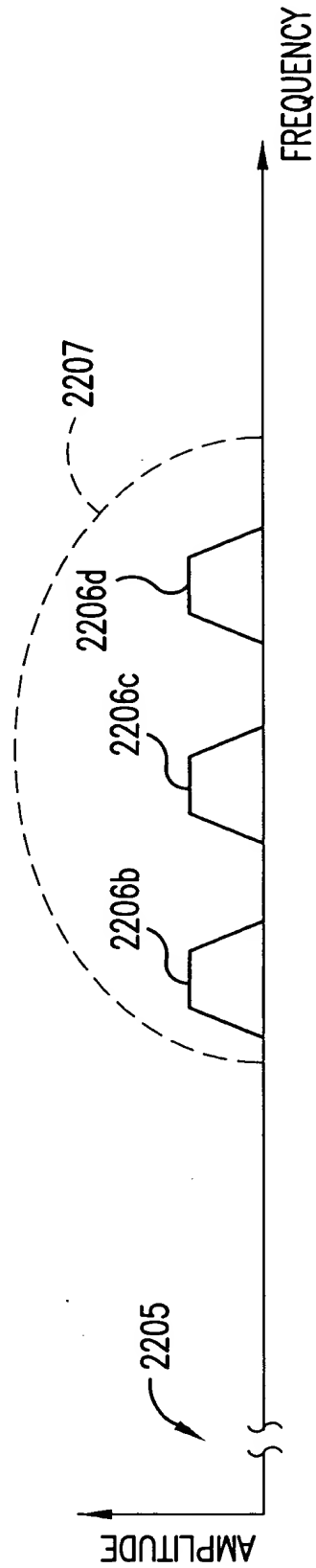
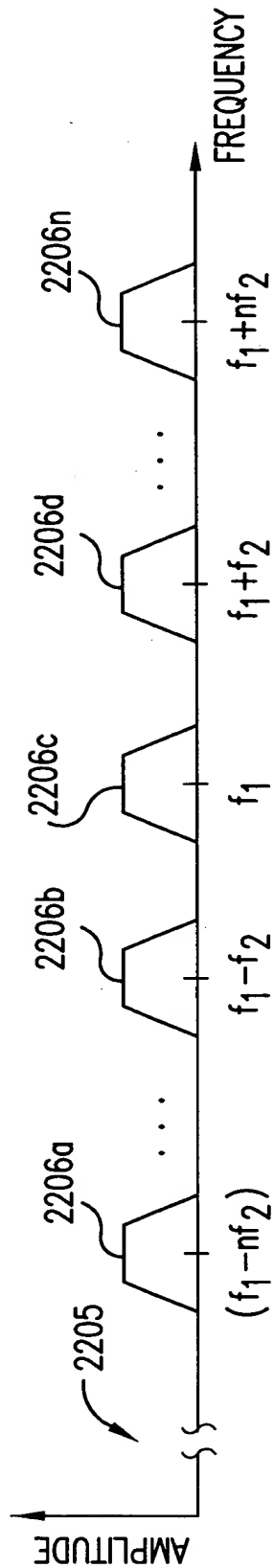
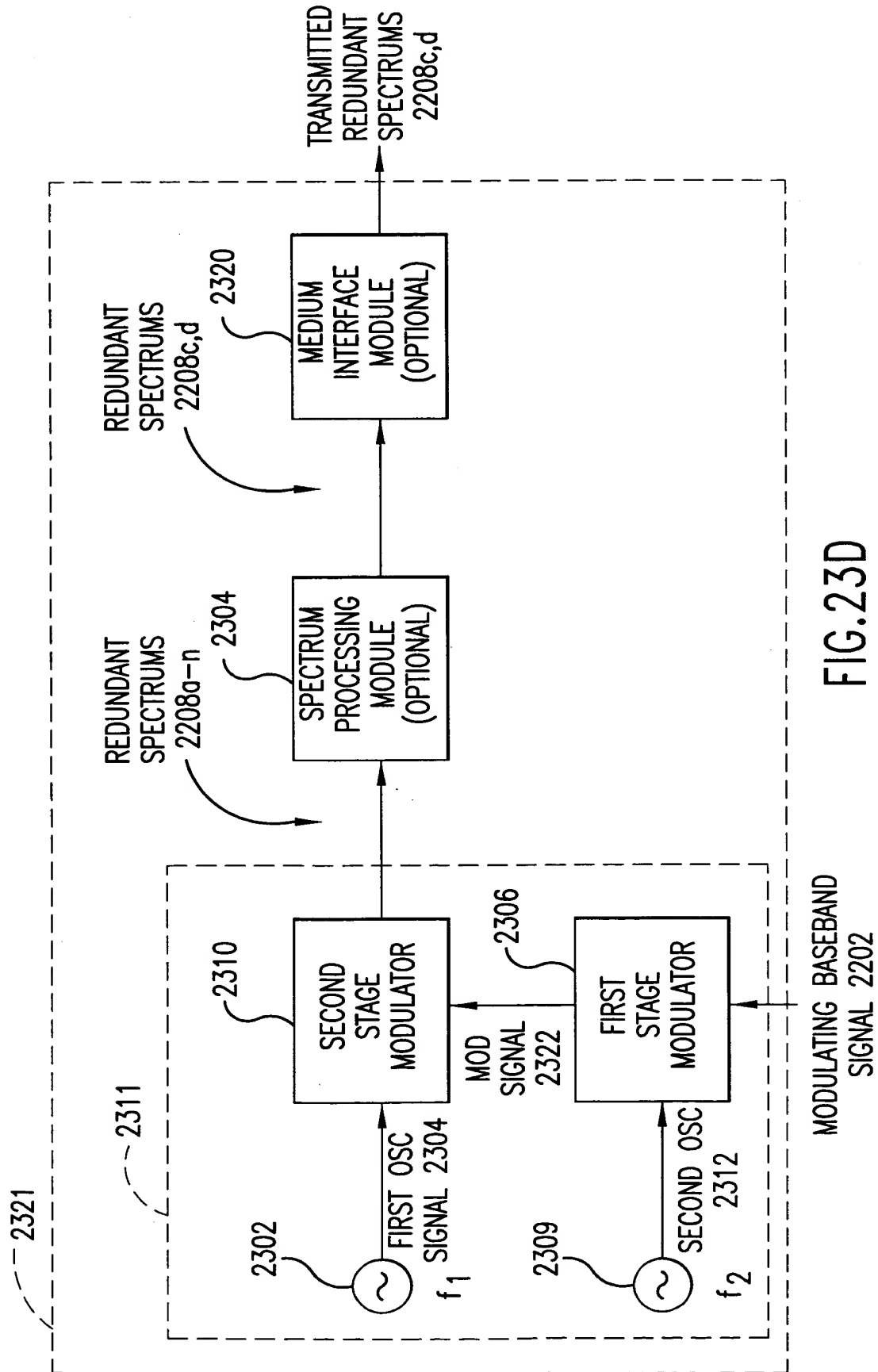
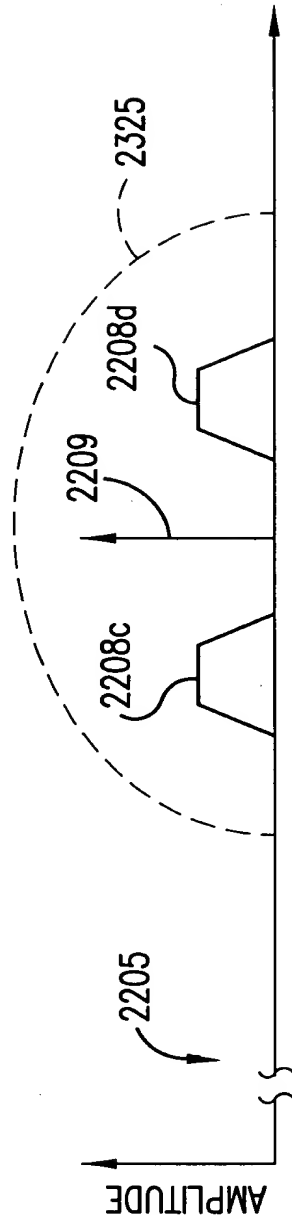
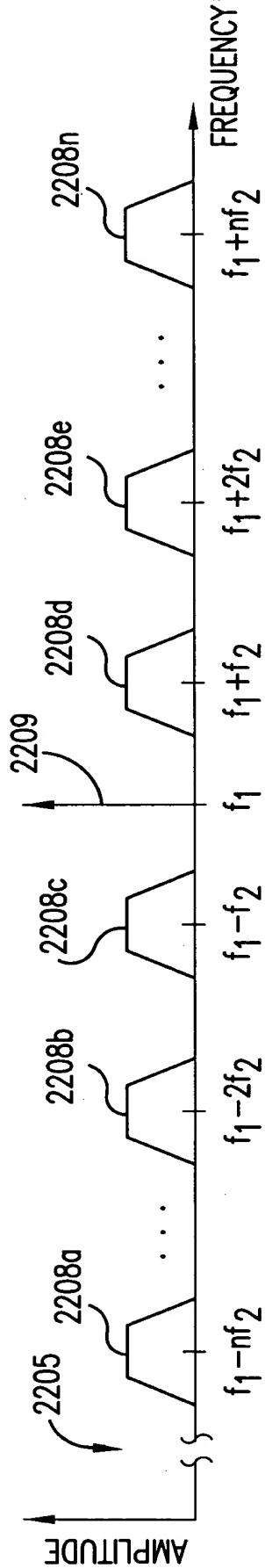


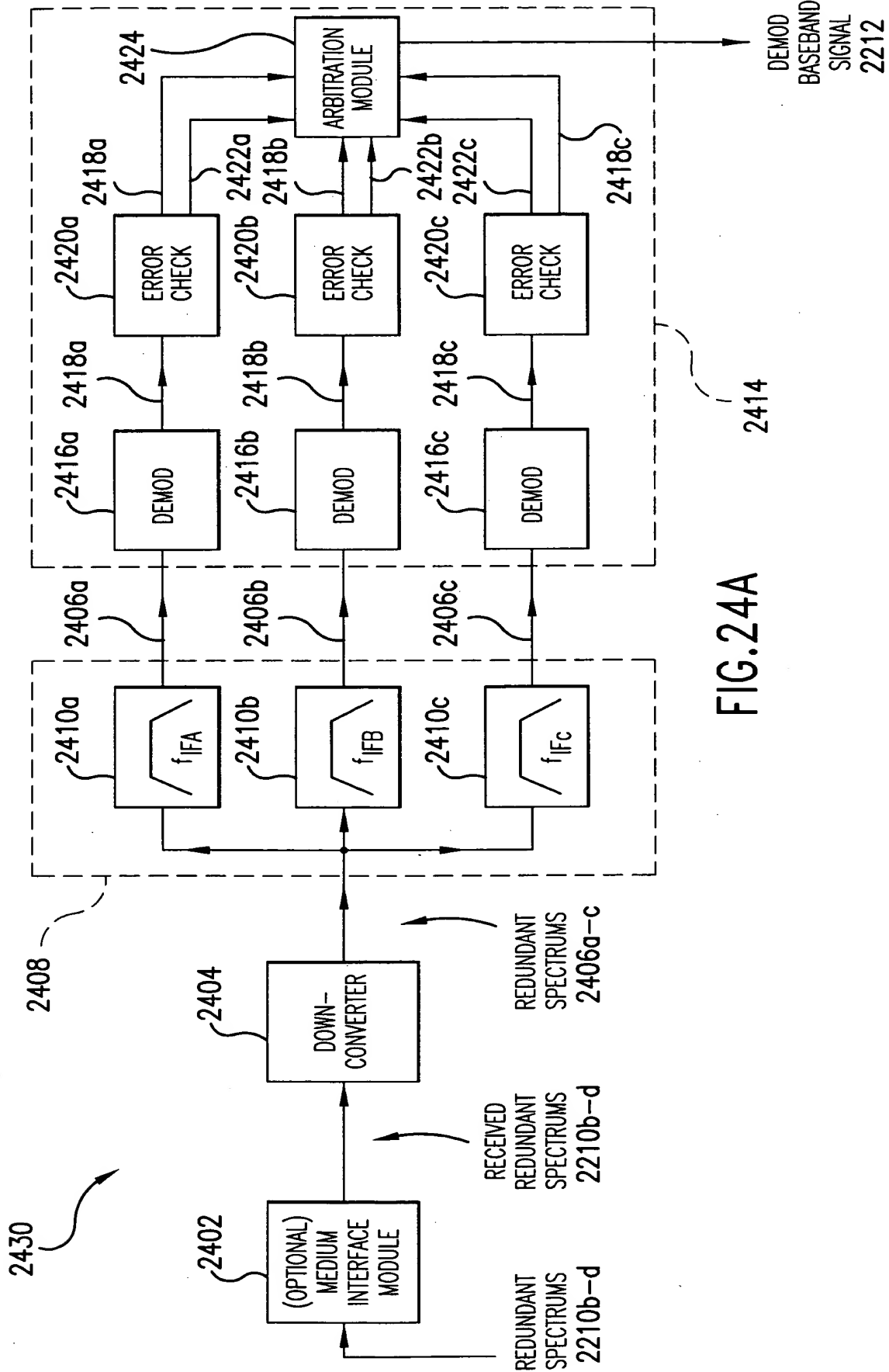
FIG. 23A











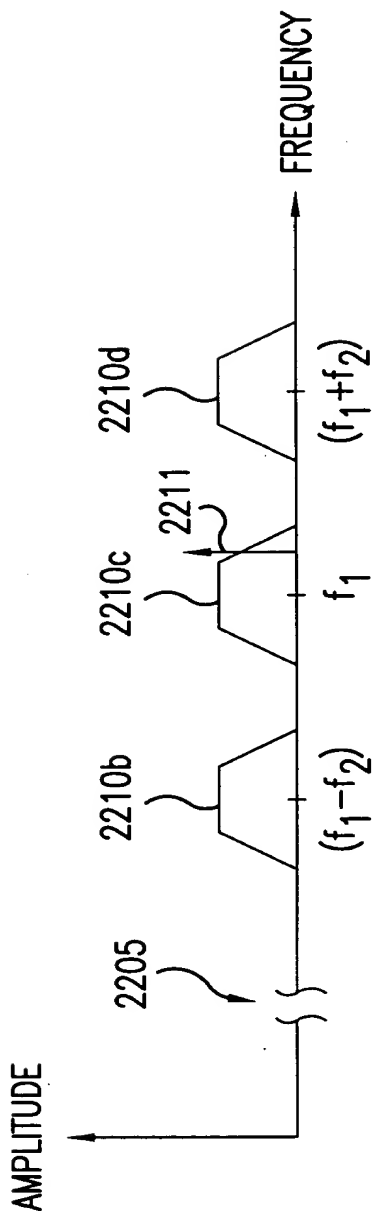


FIG. 24B

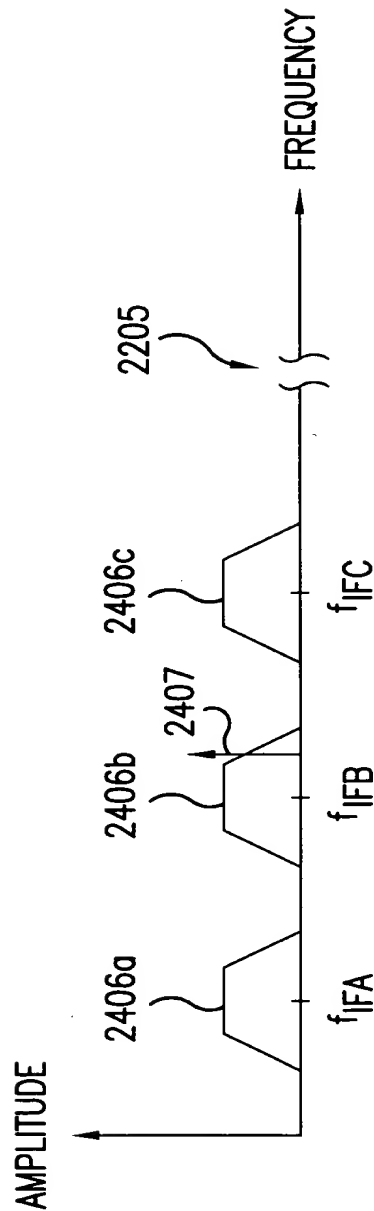
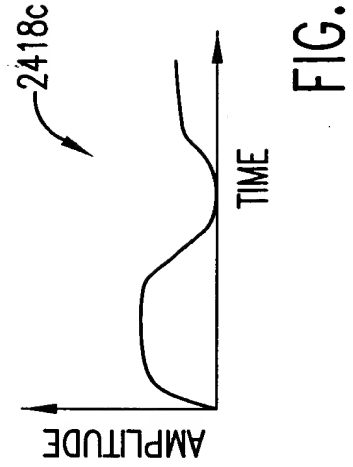
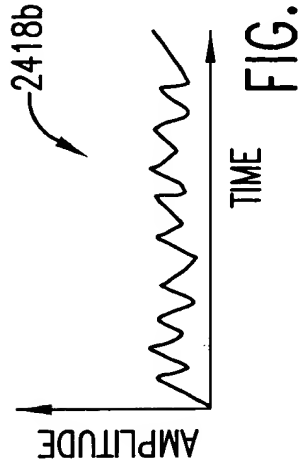
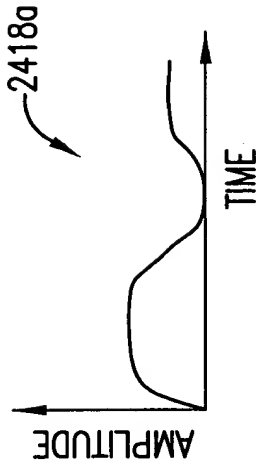
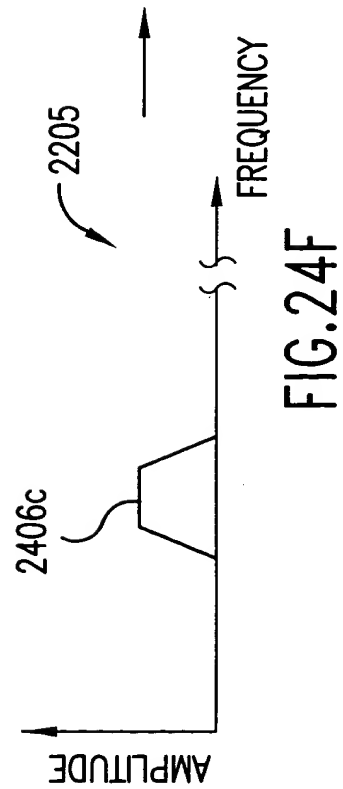
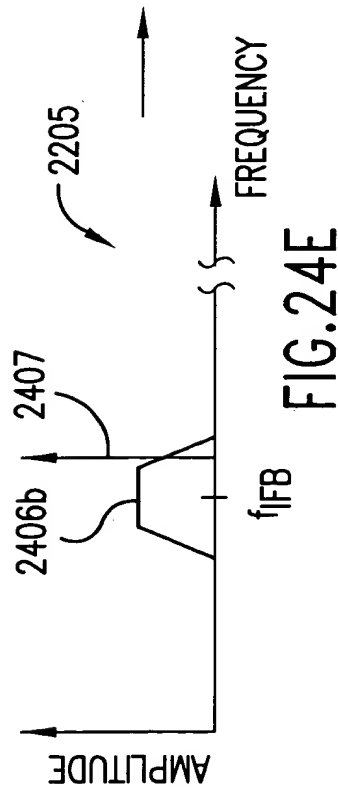
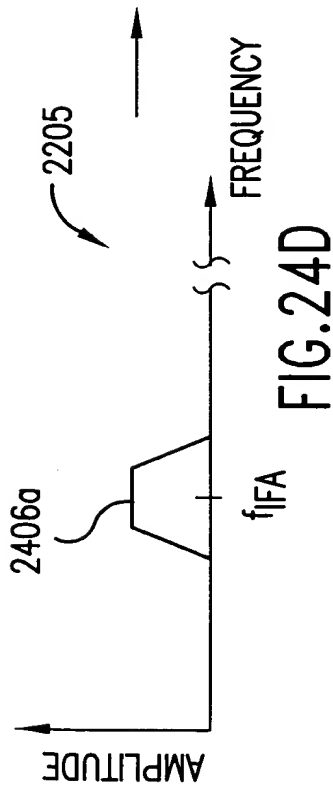


FIG. 24C



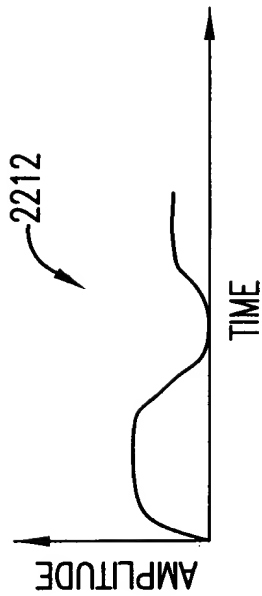


FIG. 24J

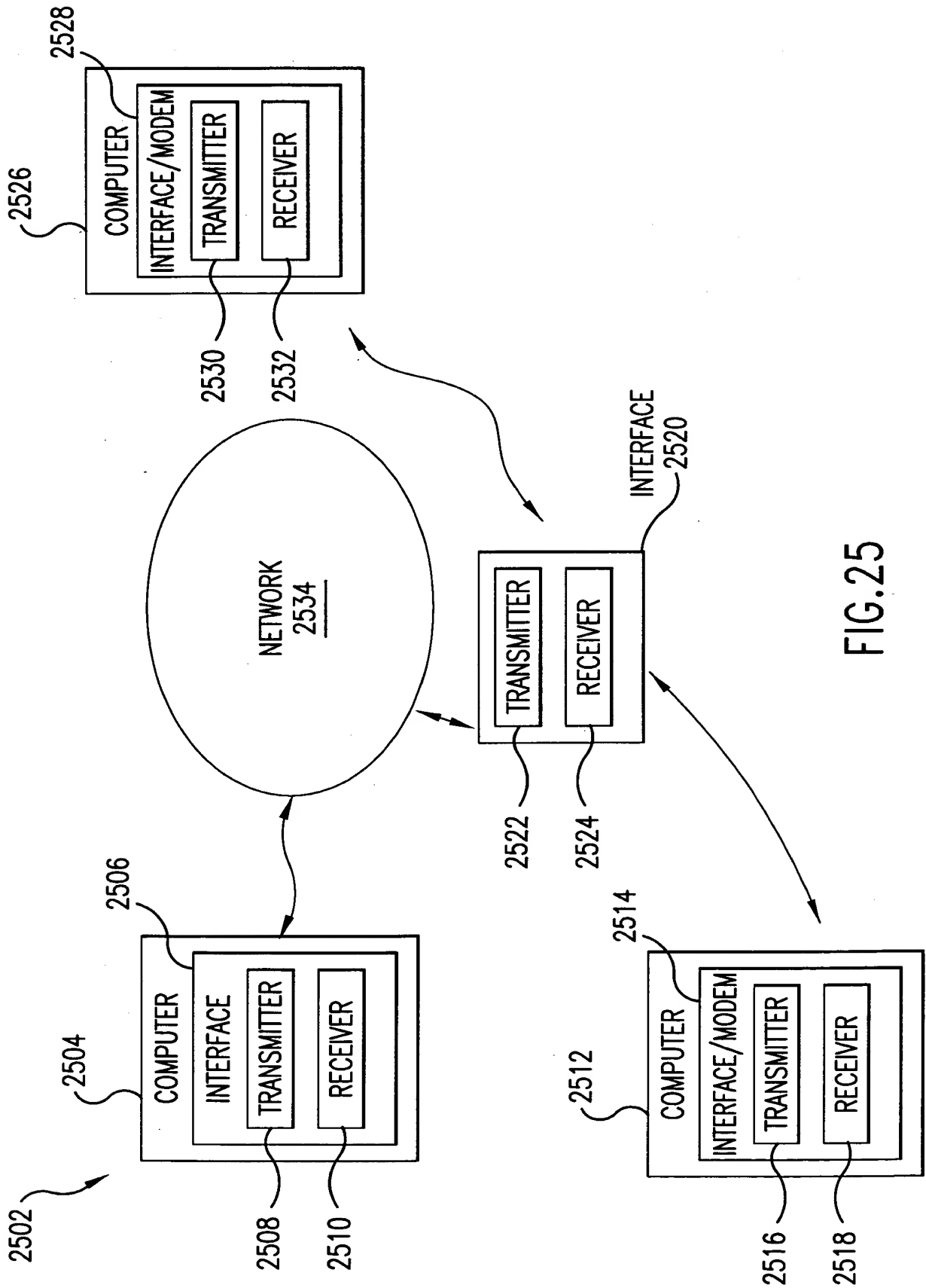


FIG. 25

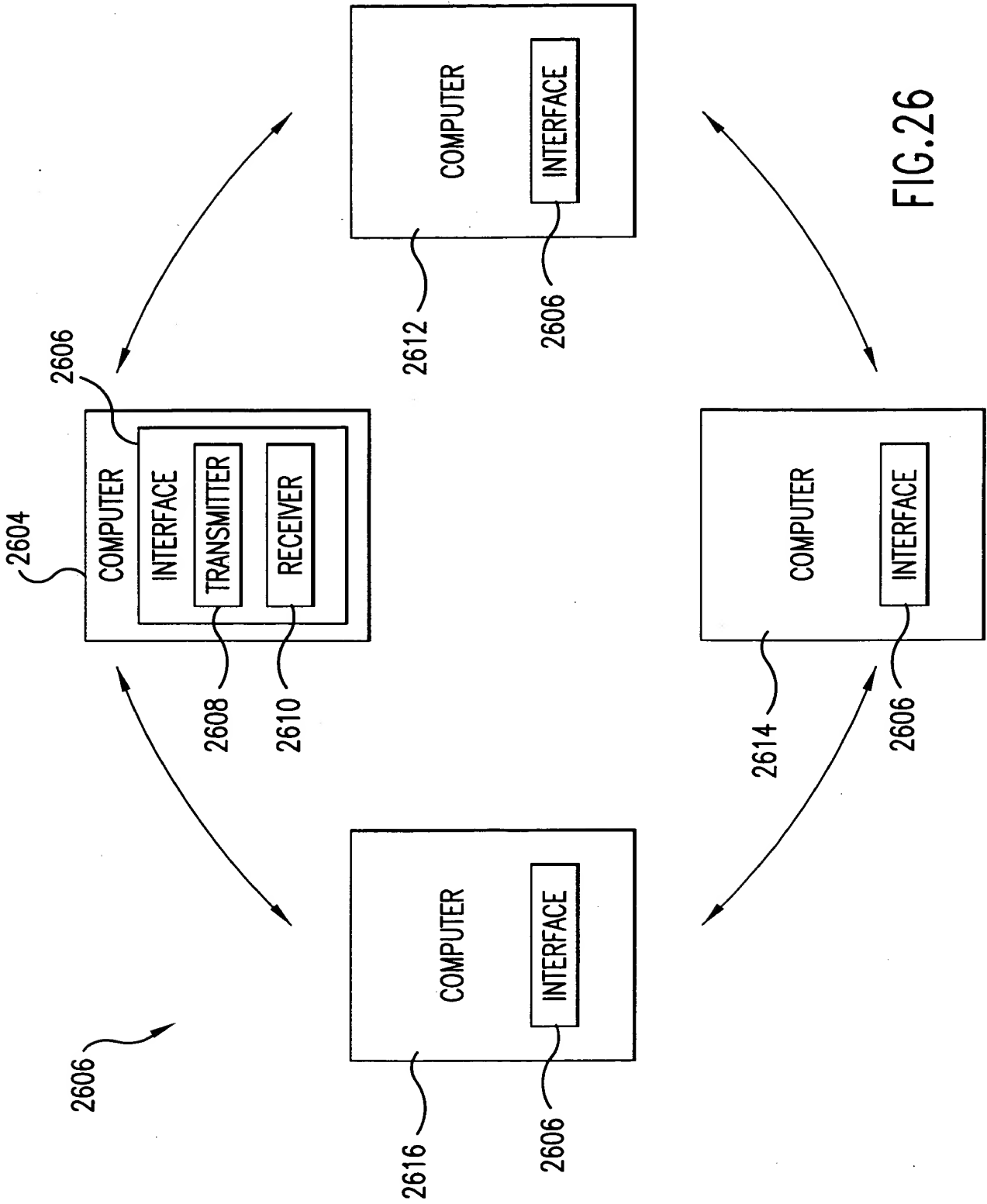


FIG. 26

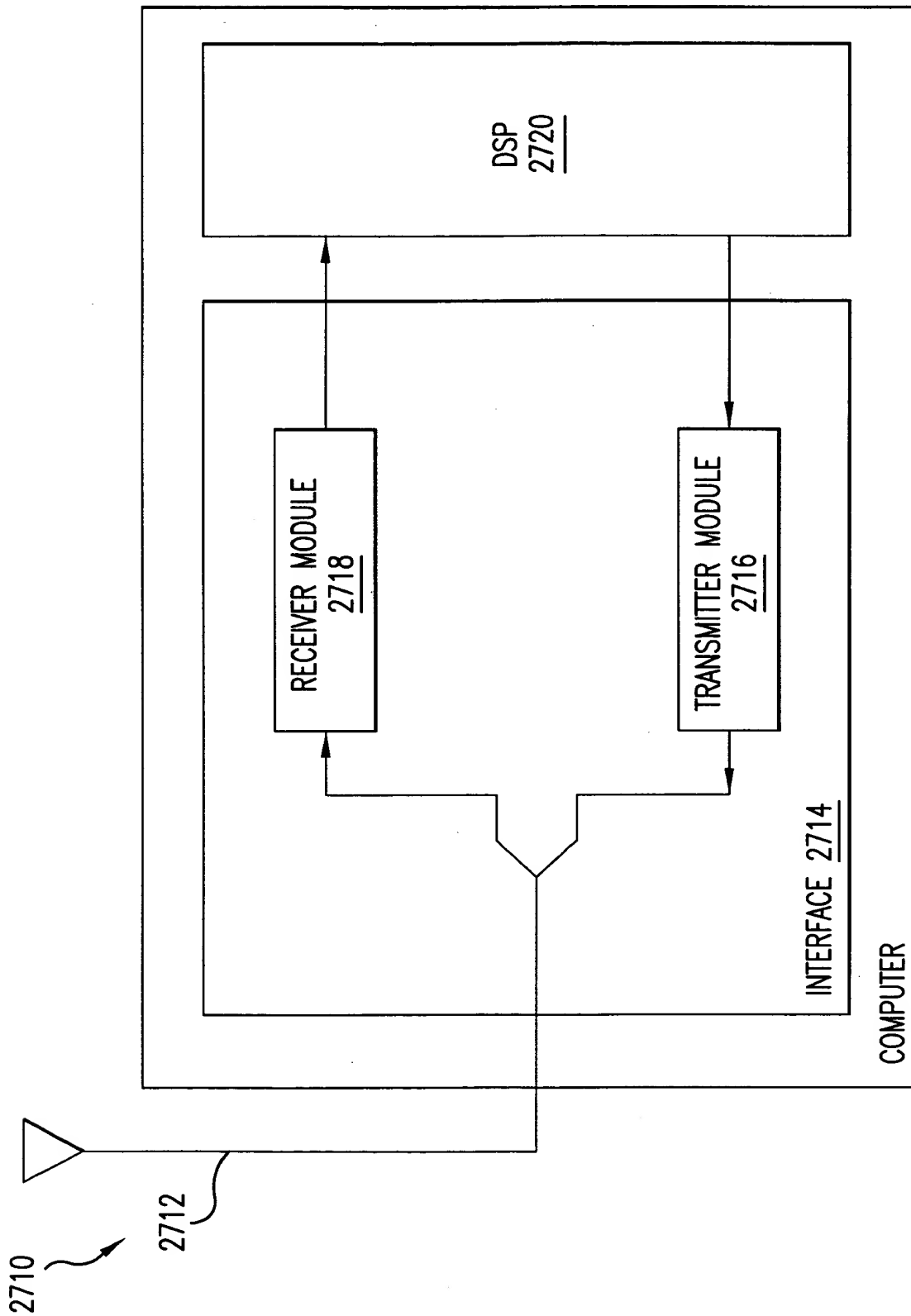


FIG. 27

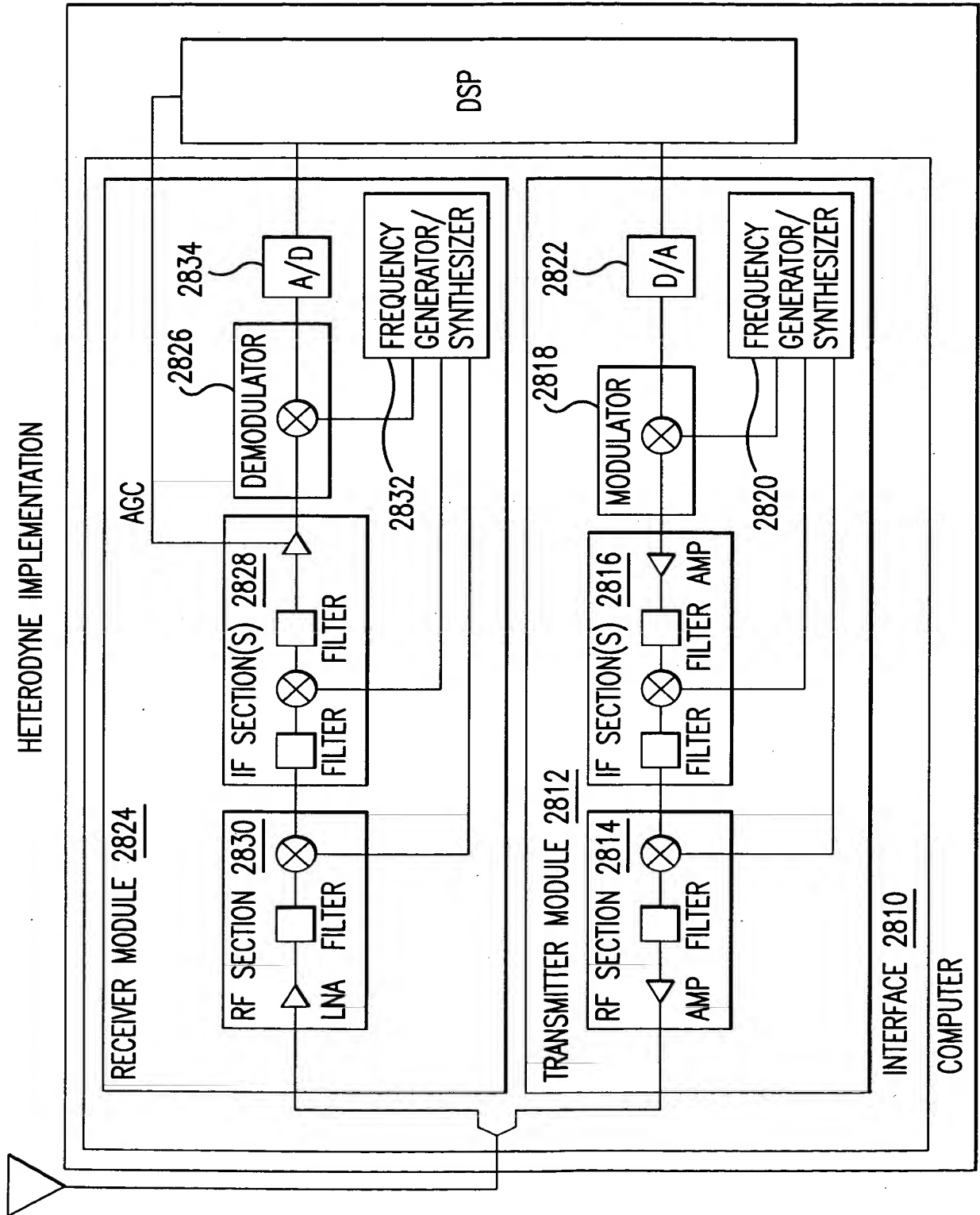
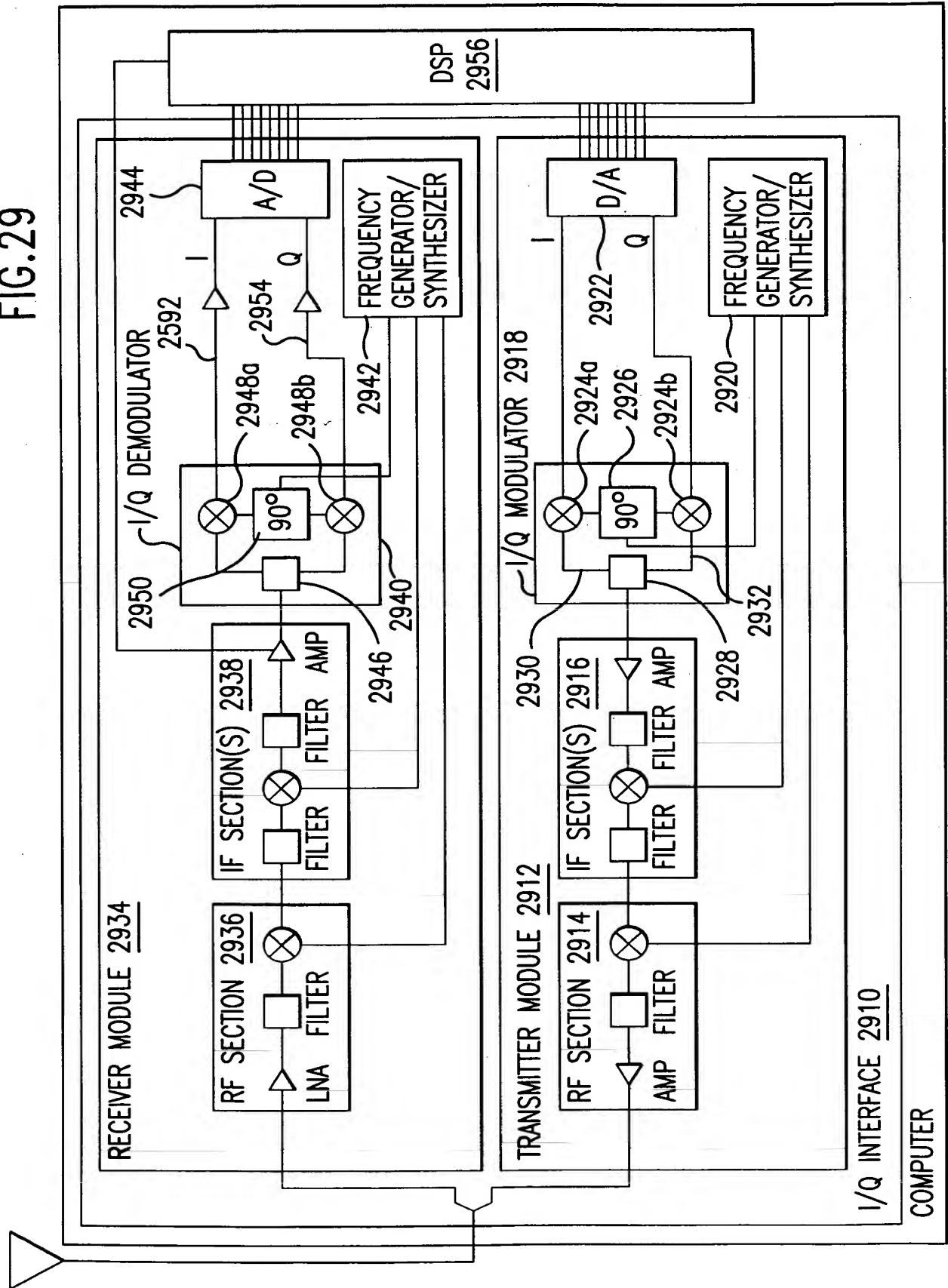


FIG.28



FIG. 29



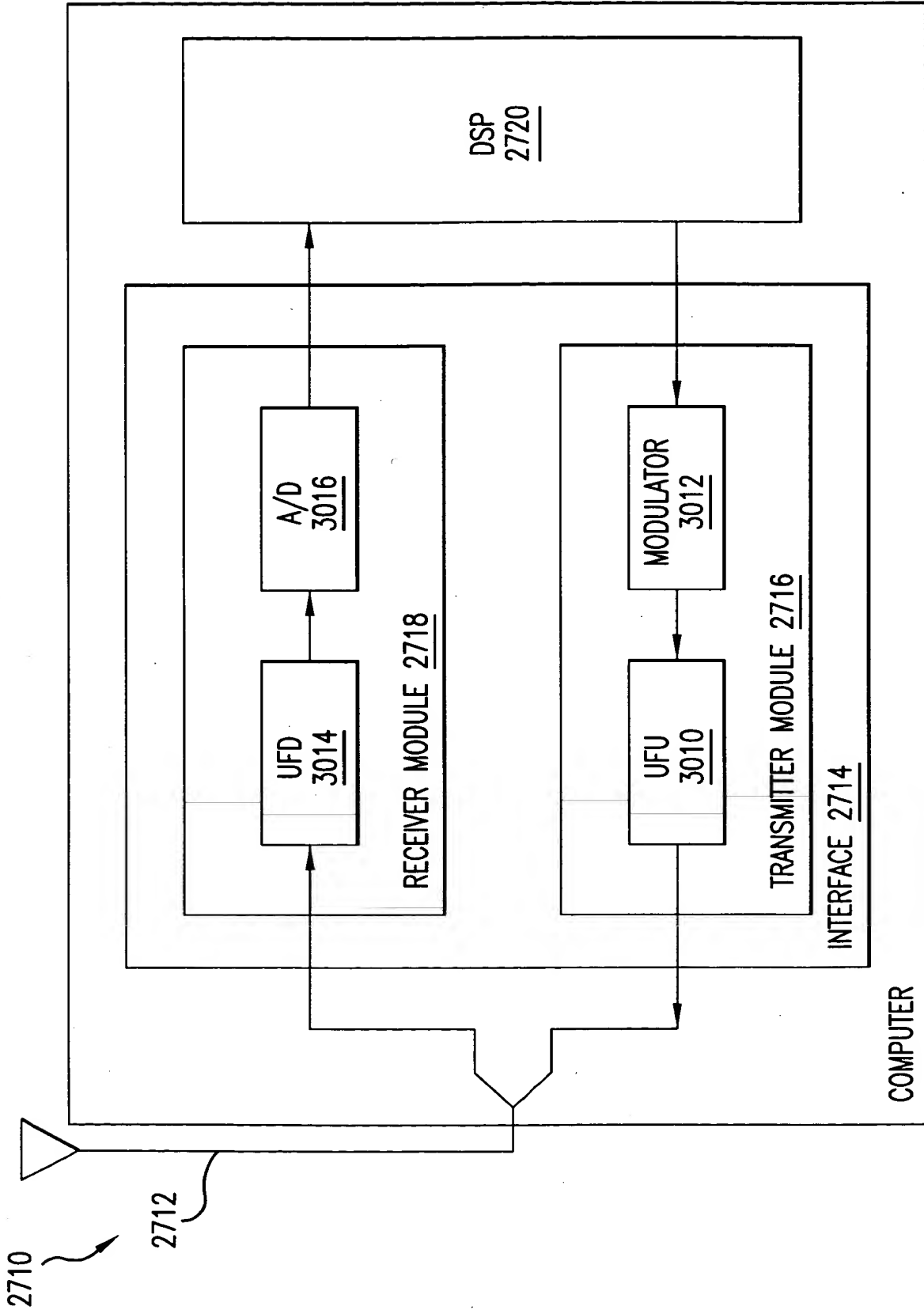


FIG.30

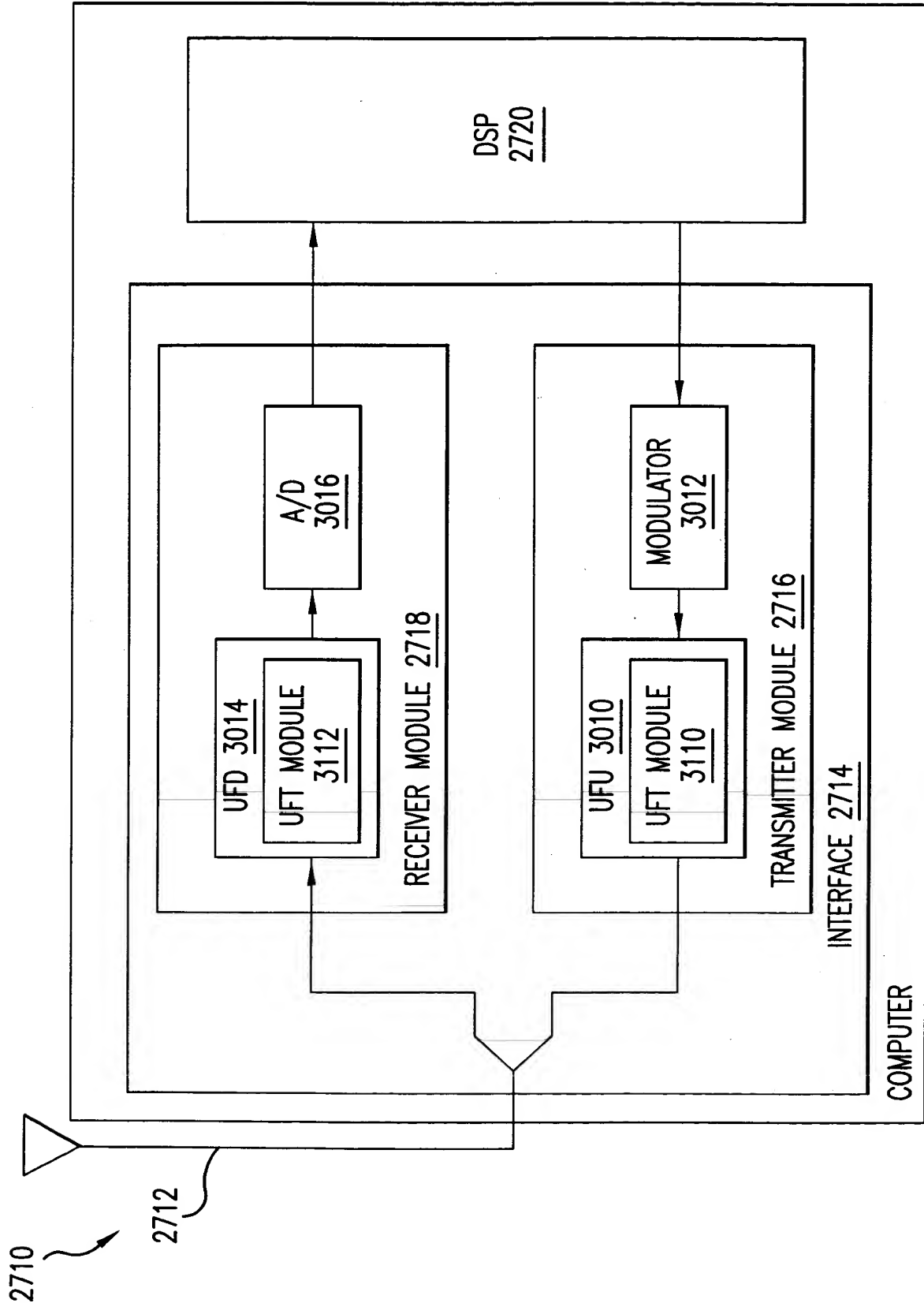


FIG. 31

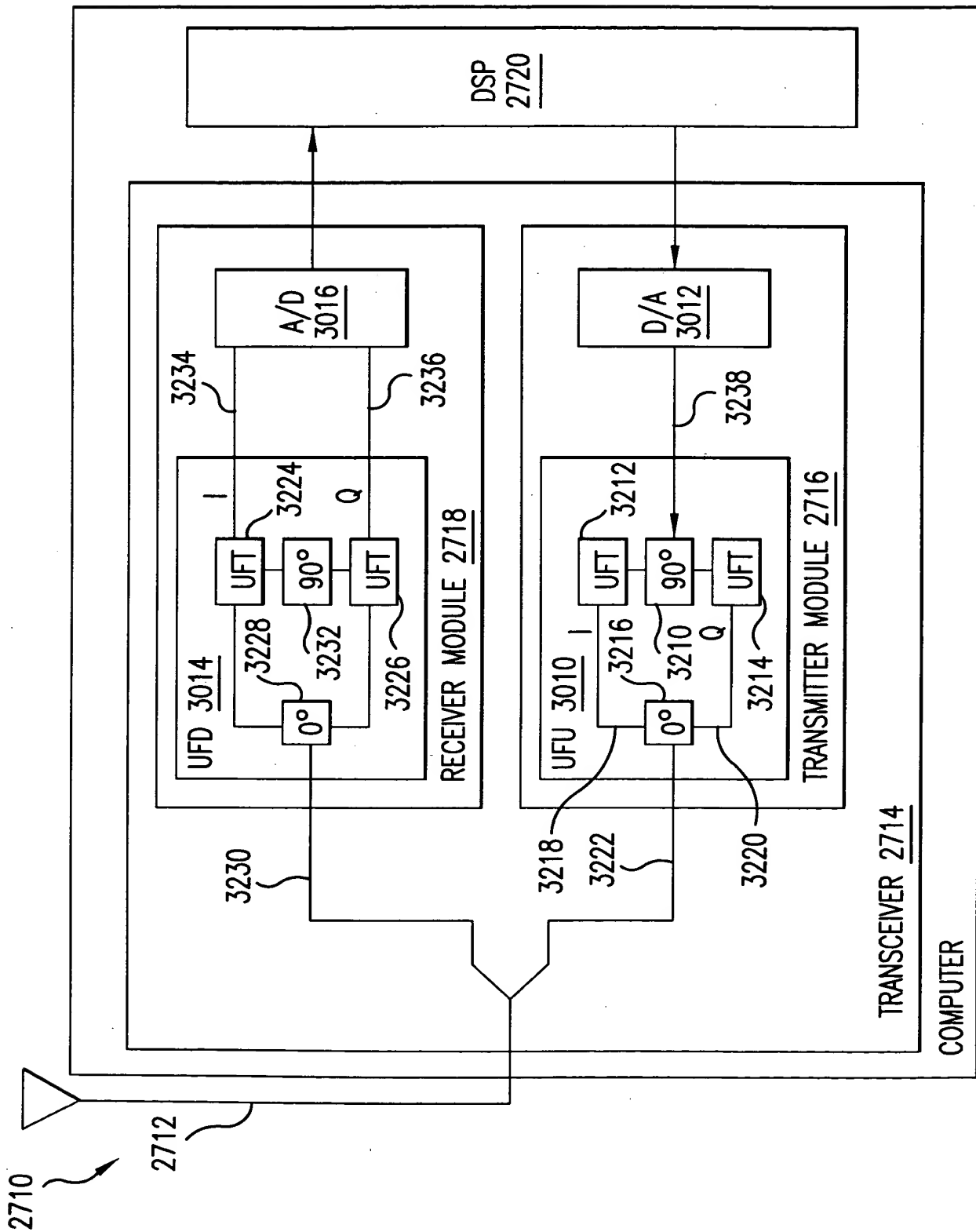


FIG. 32

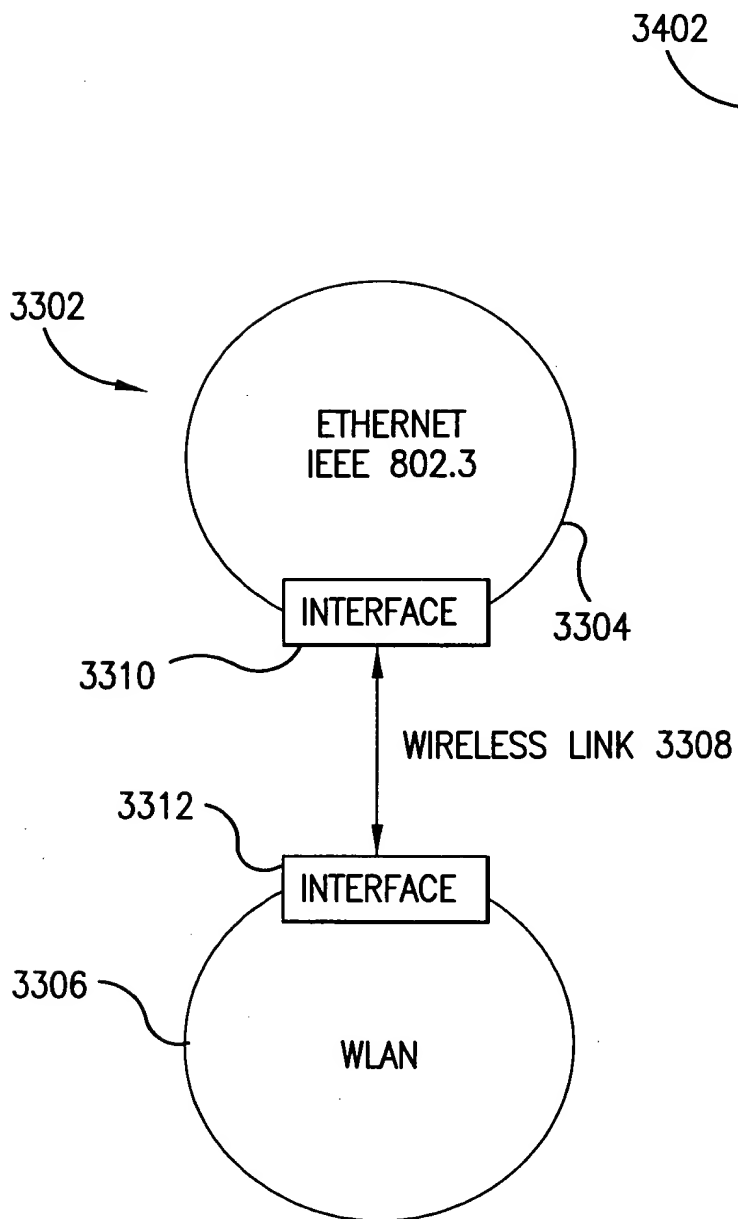


FIG.33

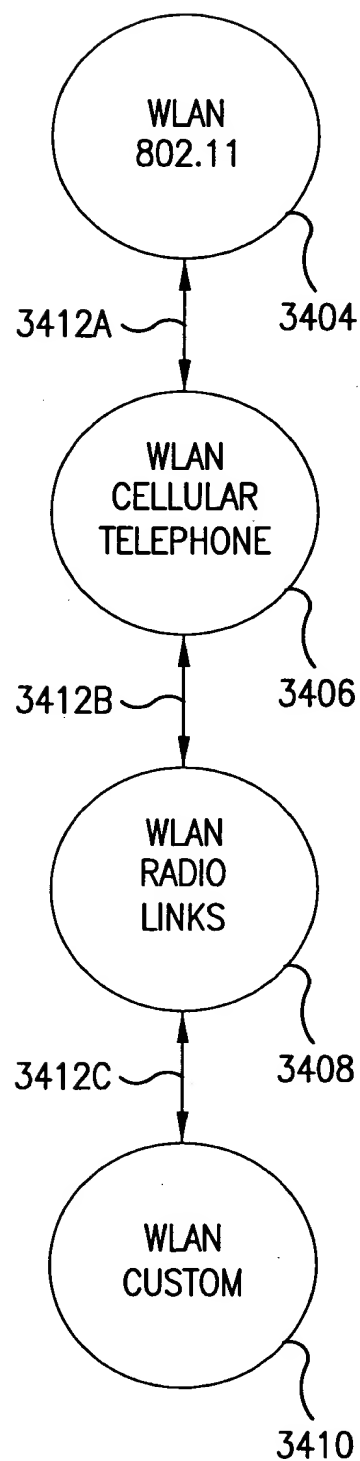


FIG.34

3502

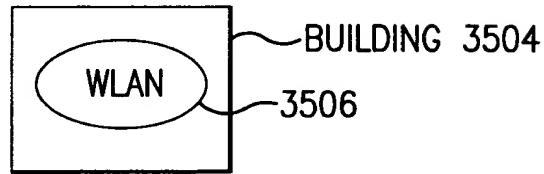


FIG.35

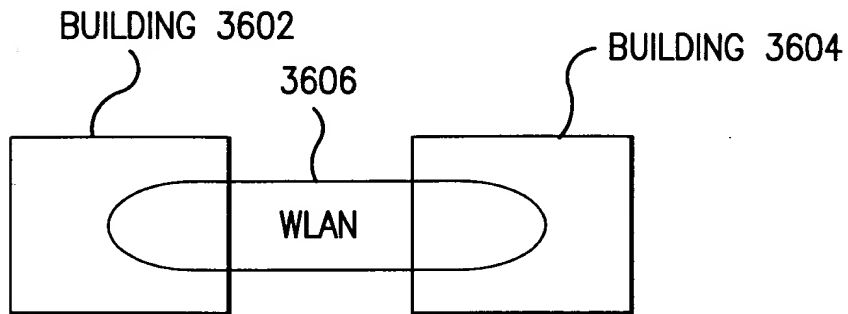


FIG.36

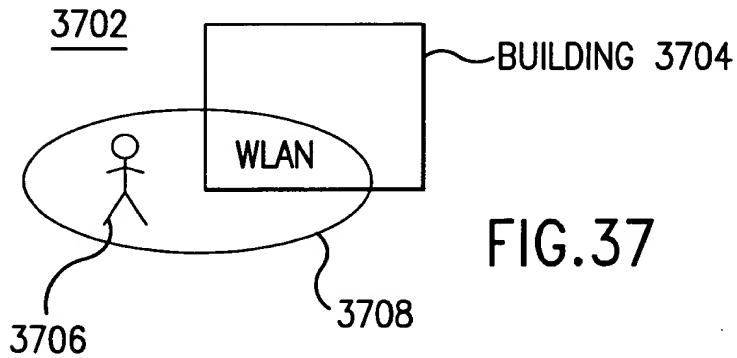


FIG.37

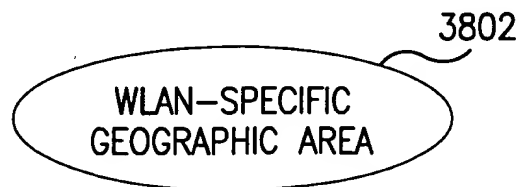


FIG.38

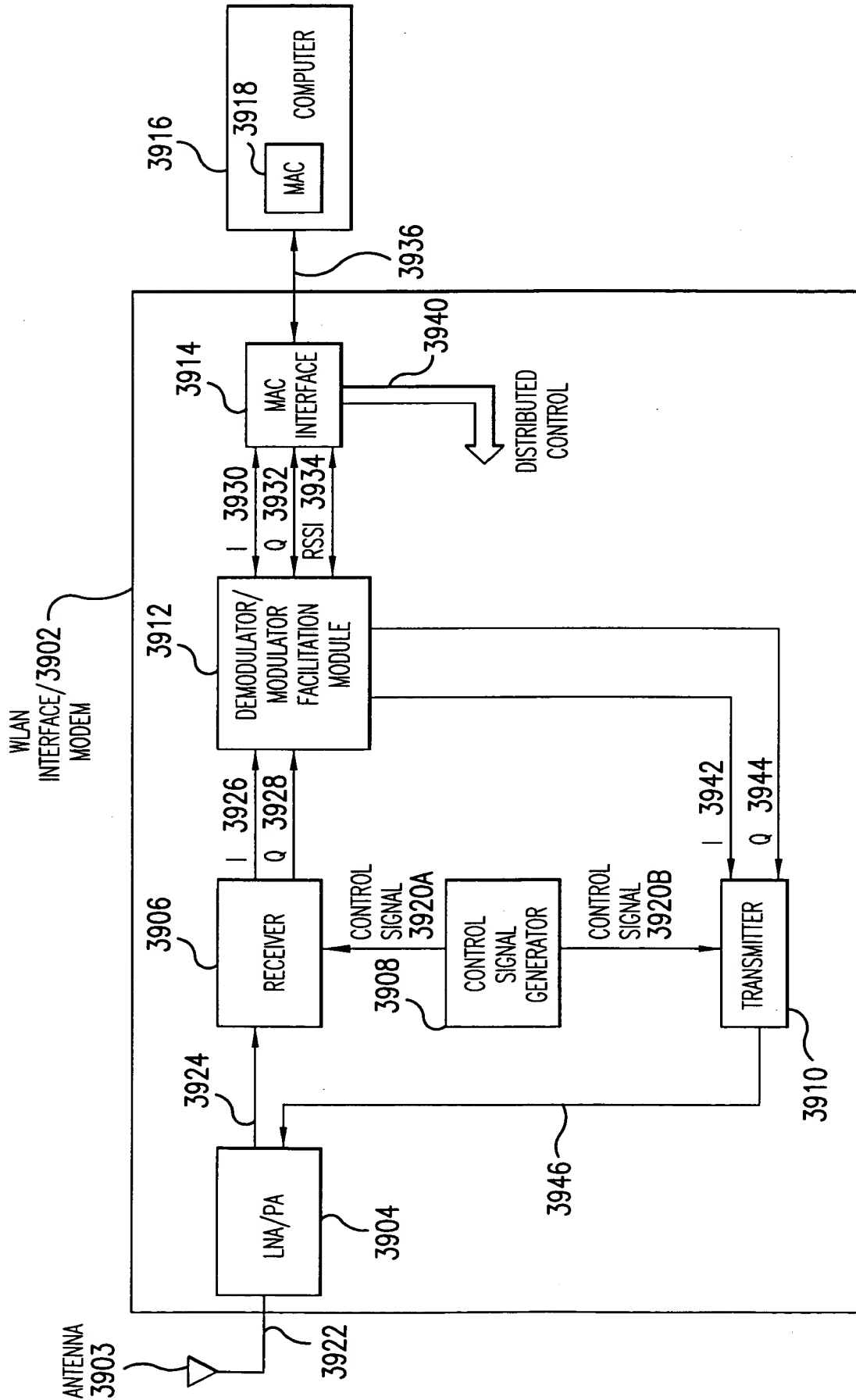


FIG. 39

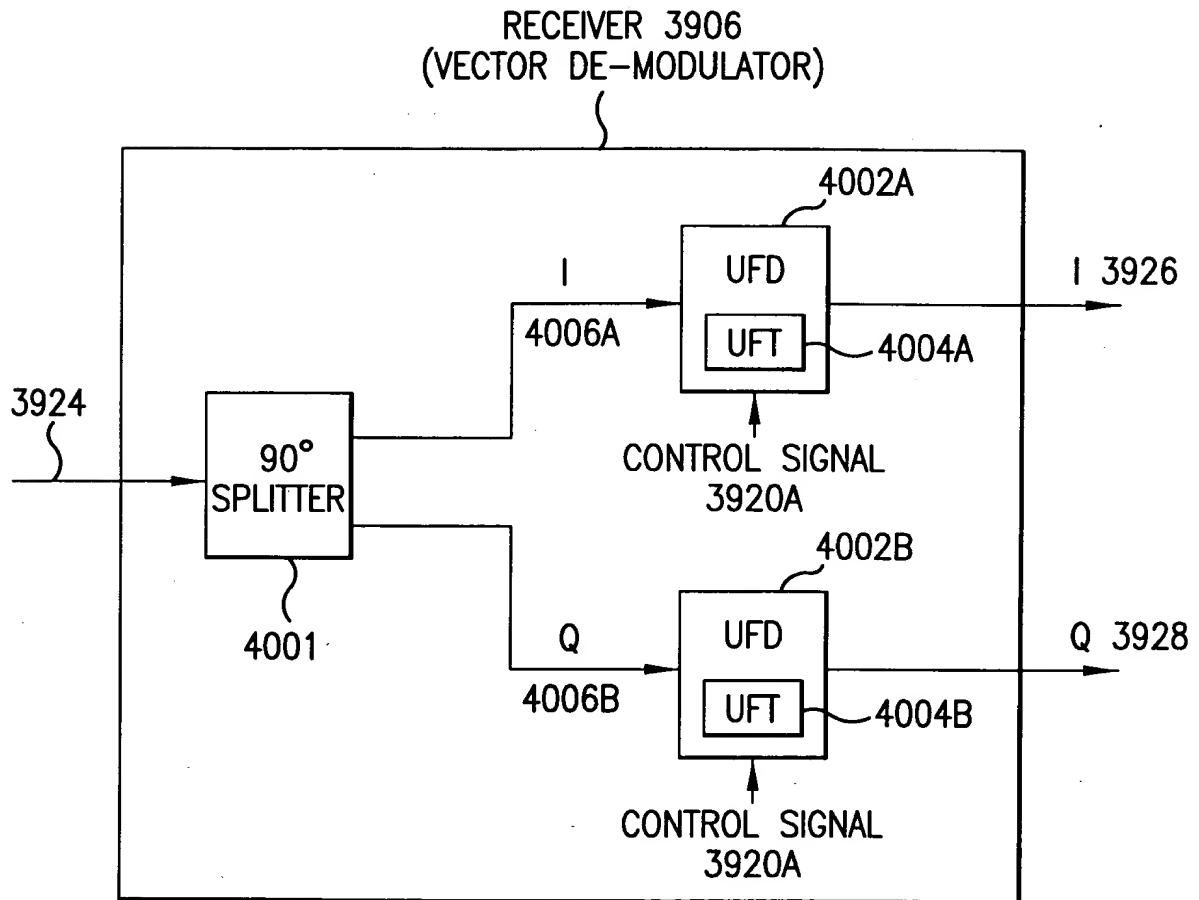


FIG.40



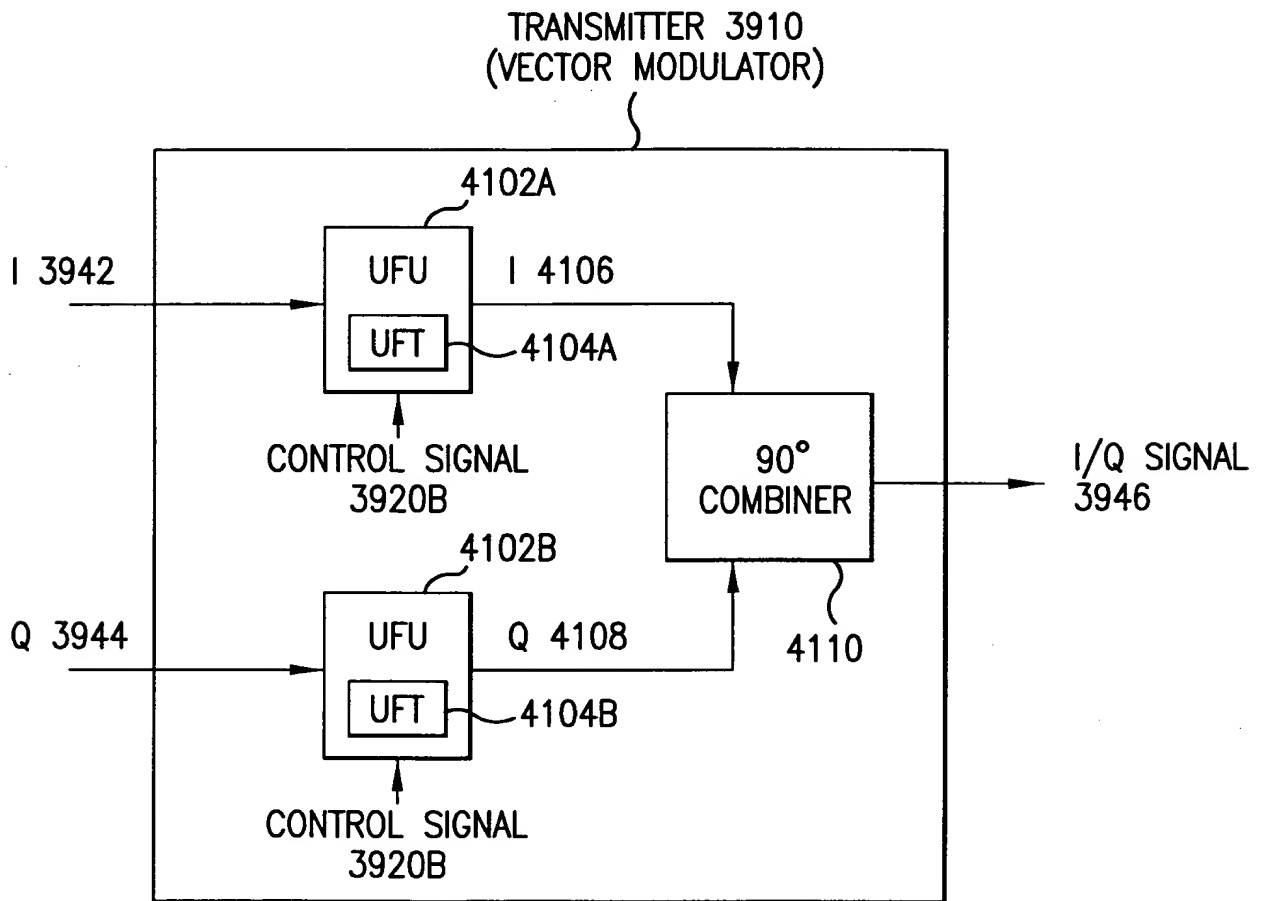


FIG.41

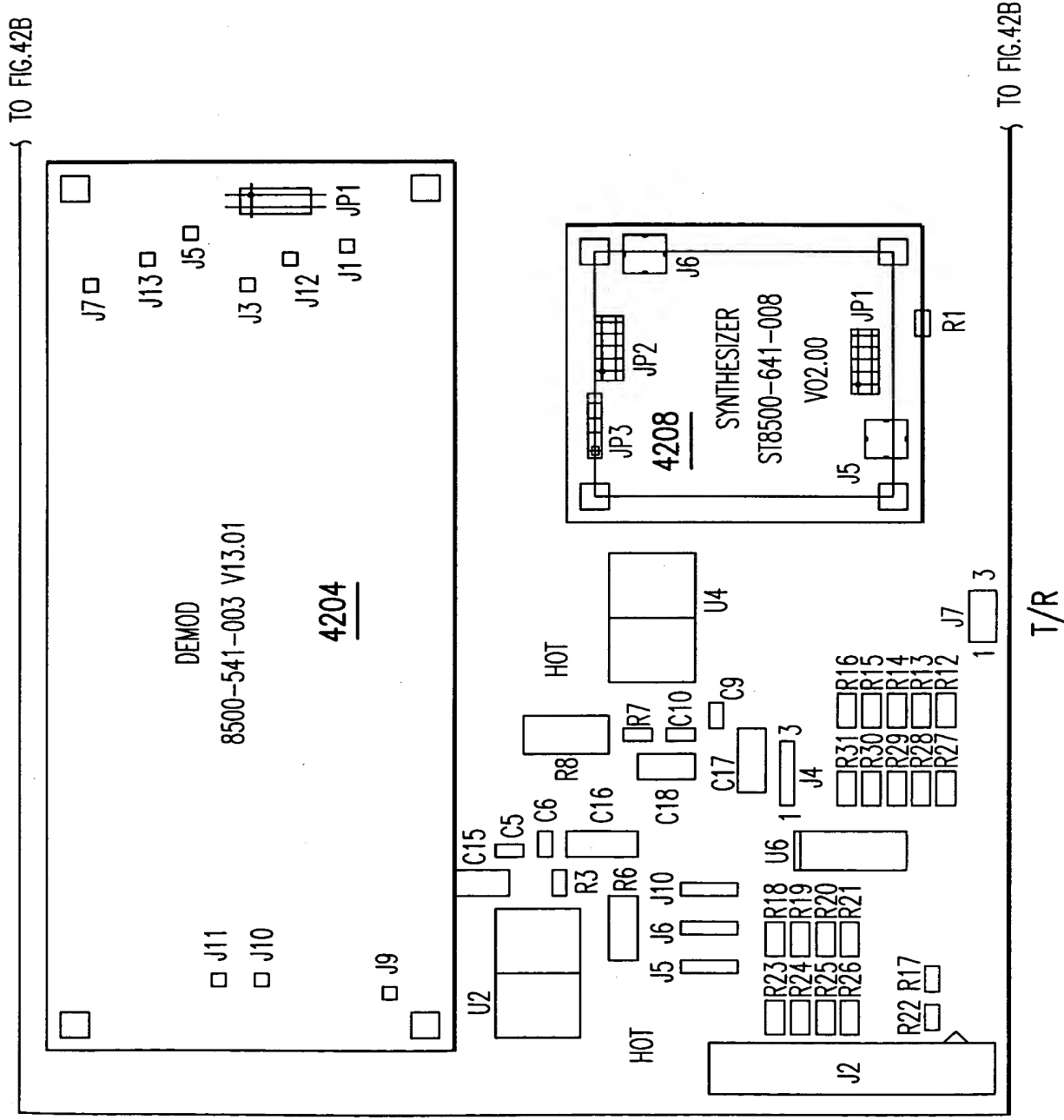
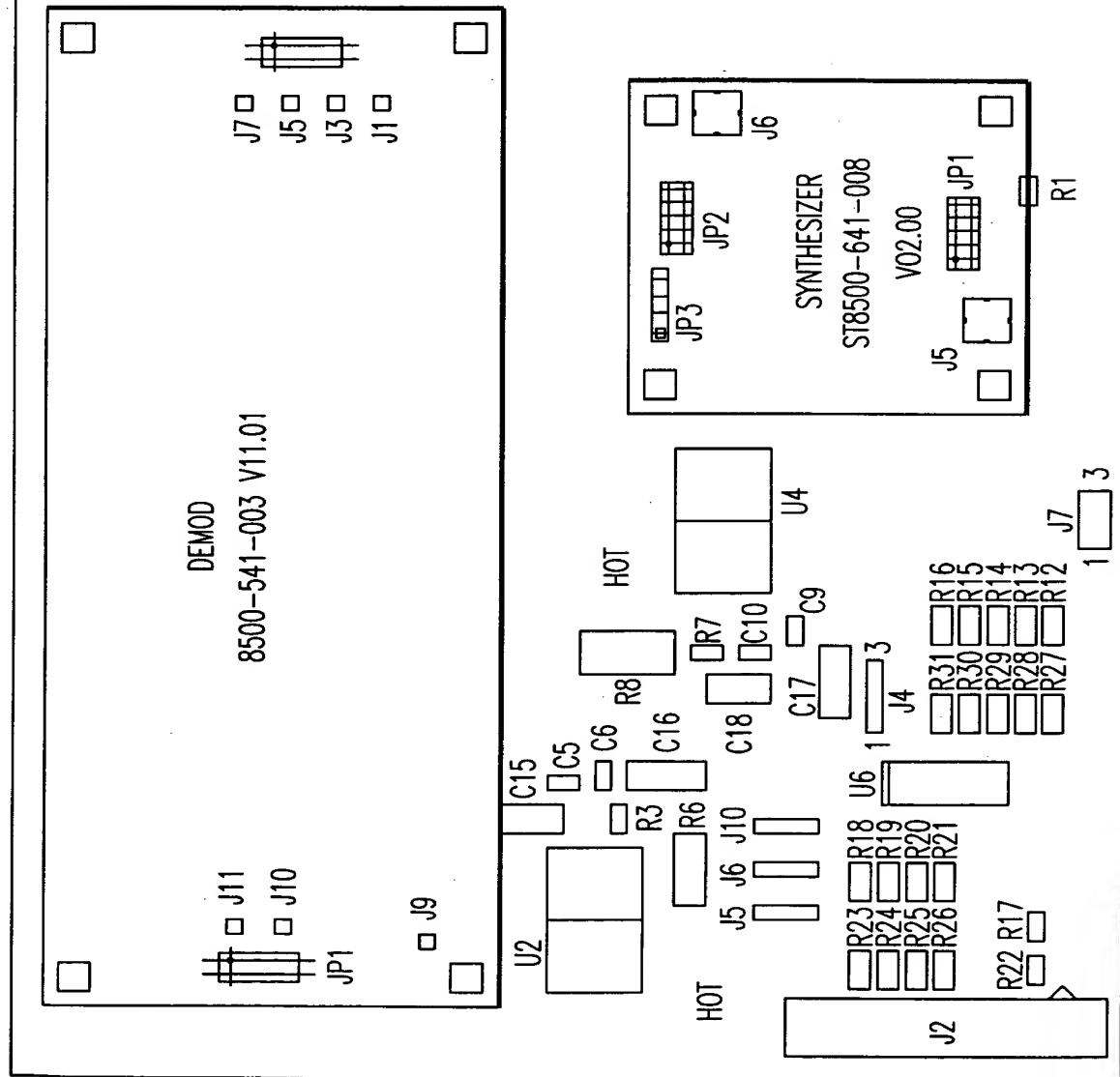


FIG.42A



4302

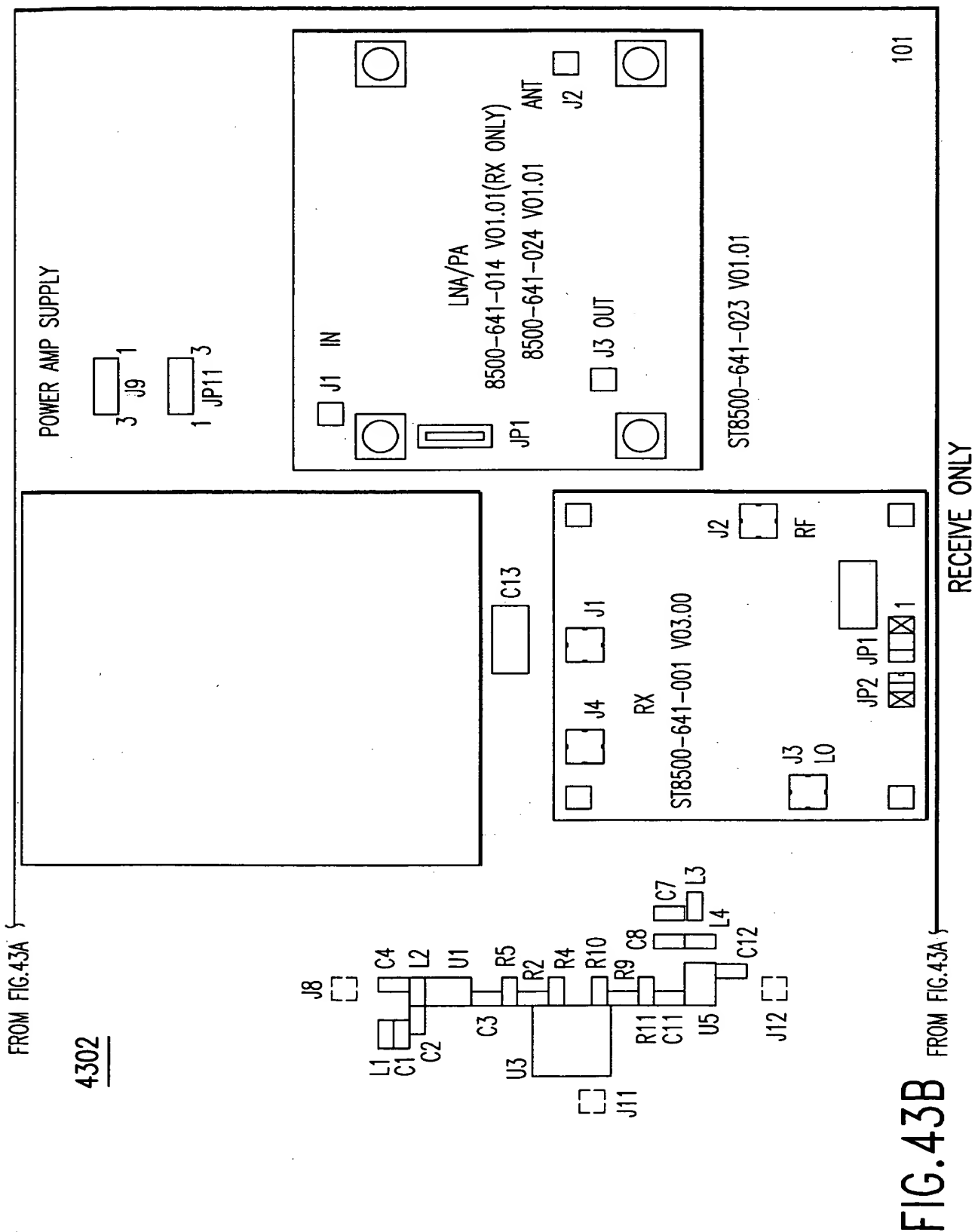
TO FIG.43B



TO FIG.43B

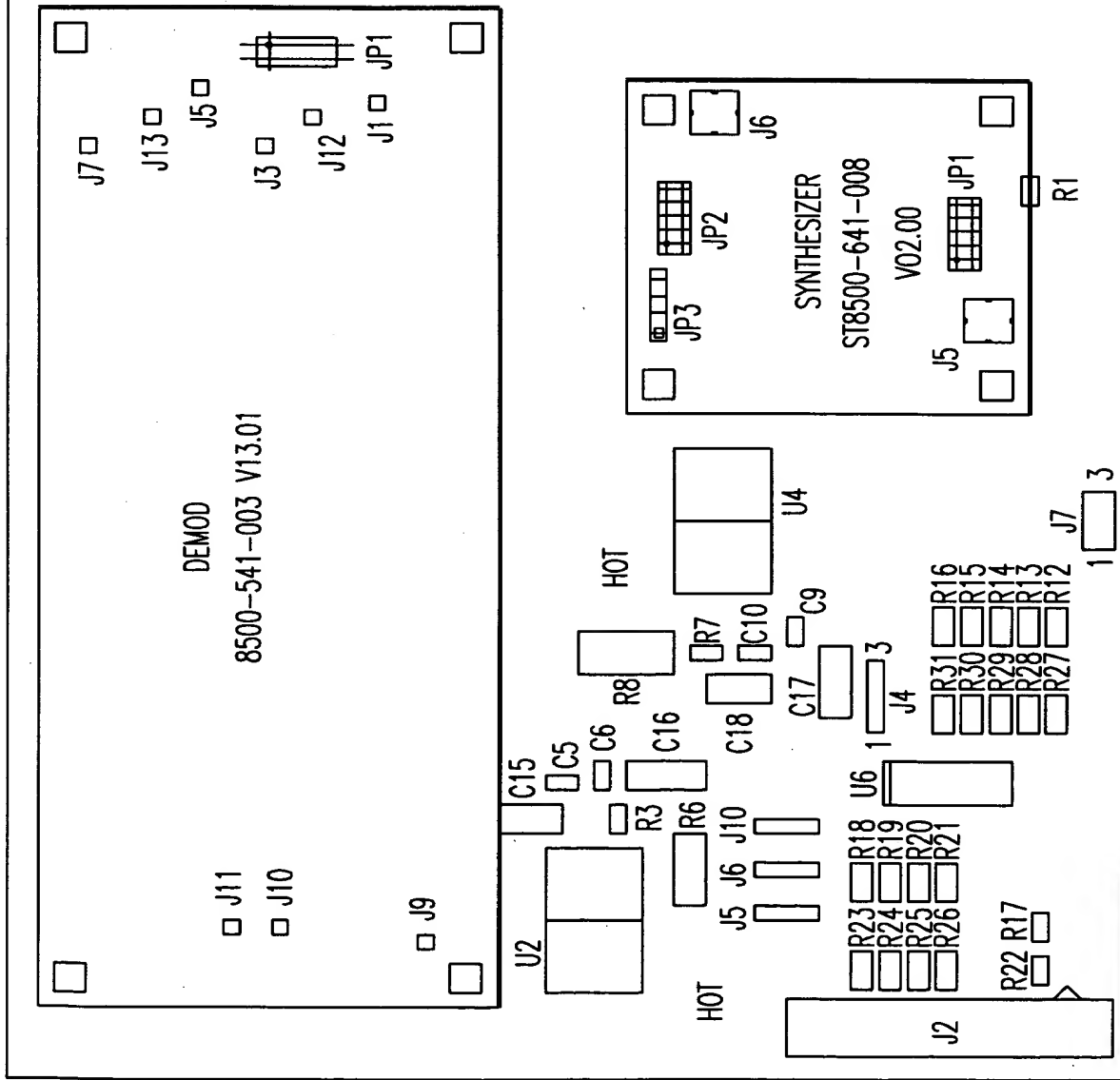
RECEIVE ONLY

FIG.43A



4402

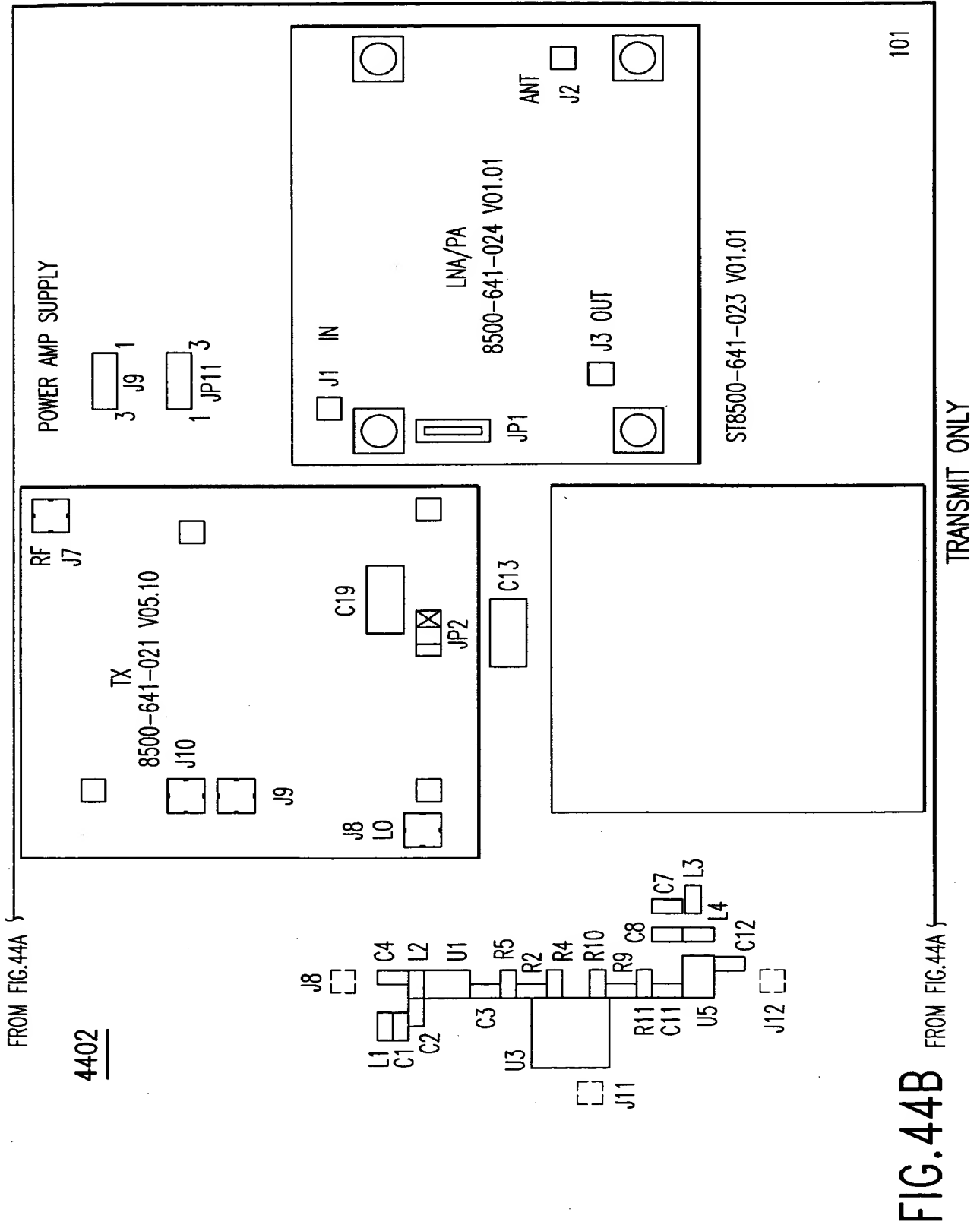
TO FIG.44B



TO FIG.44B

TRANSMIT ONLY

FIG.44A



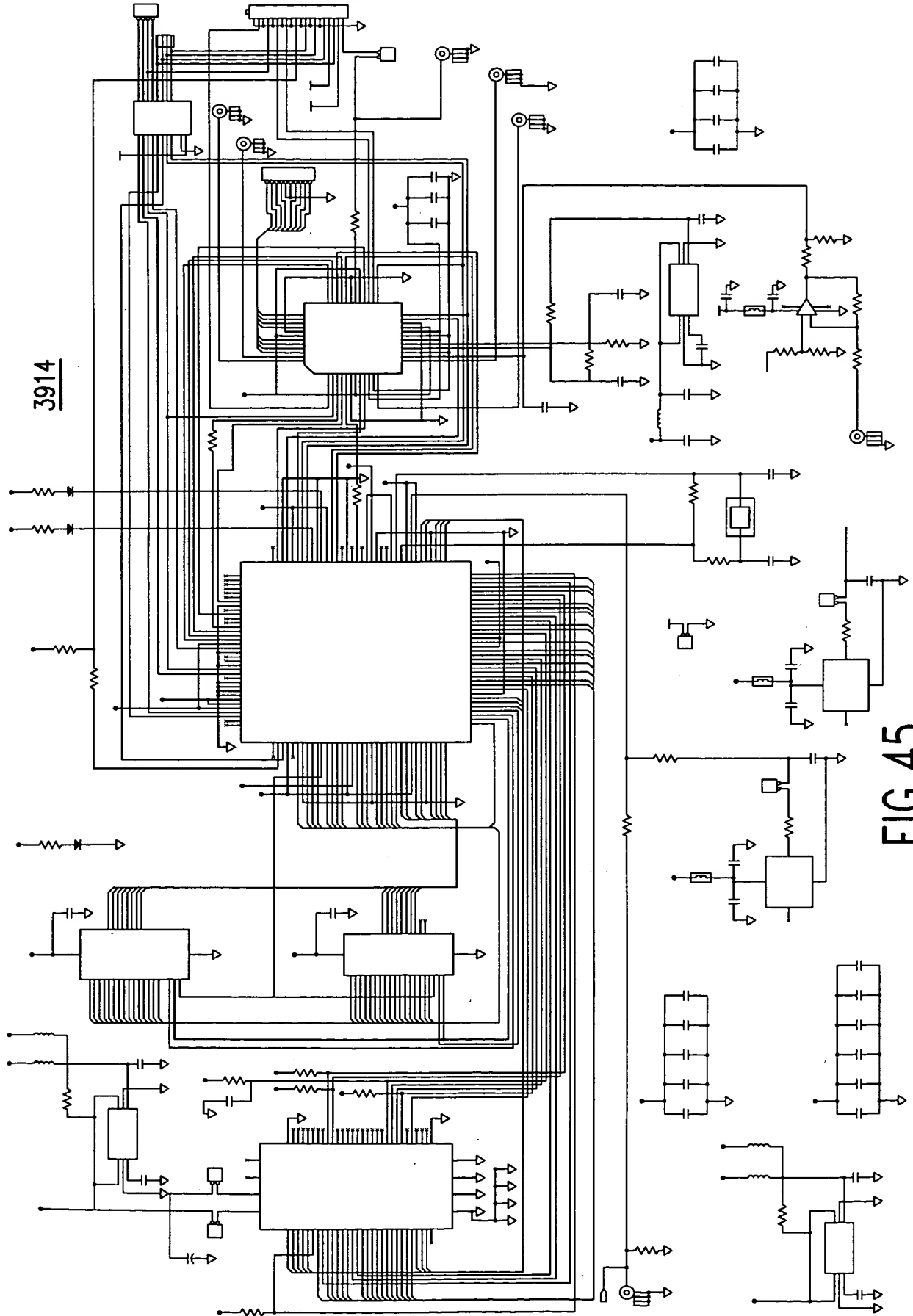


FIG. 45



Item	Quantity	Reference	Part Description	Part Number	Manufacturer
1	1	C123	10uF CAP 6032, TANTALUM, 20%	TAJT106K010R	KEMET
2	3	C263, C273, C275, C282	4.7uF CAP 6032, TANTALUM, 20%	T491A475M006AS	KEMET
3	25	C120, C125, C126, C127, C128, C136, C137, C138, C139, C140, C141, C142, C143, C144, C145, C147, C148, C149, C264, C272, C274, C279, C280, C281, C283	0.1uF CAP 0603, X7R, 10%	GRM39X7R104K050AD	MURATA
4	3	C146, C269, C276	.01uF CAP 0603, X7R, 10%	GRM39X7R103K050AD	MURATA
5	5	C124, C132, C133, C271, C278	100pF CAP 0603, X7R, 10%	GRM39C0G101K050AD	MURATA
6	1	C129	47pF CAP 0603, X7R, 10%	GRM39C0G470J100AD	MURATA
7	2	C270, C277	27pF CAP 0603, X7R, 10%	GRM39C0G270K050AD	MURATA
8	1	C130	22pF CAP 0603, X7R, 10%	GRM39C0G220K050AD	MURATA
9	1	C131	10pF CAP 0603, X7R, 10%	GMR39C0G100D050AD	MURATA
10	1	DS1	LED GREEN	597-3311-420	DIALIGHT
11	1	DS2	LED YELLOW	597-3401-420	DIALIGHT
12	1	DS3	LED RED	597-3111-420	DIALIGHT
13	6	JP12, JP13, JP14, JP15, JP16, JP17	CONNECTOR HEADER 2PIN	2MS-19-33-01	SPECIALTY ELECTRONICS
14	1	JP11	CONNECTOR HEADER 4PIN	100/VH/TM1SQ/W.100/4	BLKCON

FIG. 46A

15	7	J16, J20, J21, J22, J23, J24, J25	CONNECTOR 82MMCX	82MMCX-50-0-1	HUBER/SHUNER
16	1	J18	CONNECTOR HEADER 10	TMS-110-01-G-S	SAMTEC
17	1	J19	CONNECTOR WITH EJECTOR	EHT-1-10-01-S-D	SAMTEC
18	1	P1	CONNECTOR 34X2PCMCIA	DICMJ-68S-SPC-M08	ITT CANON
19	7	L59, L60, L61, L63, L64, L65, L66	FERRITE BEAD	BLM1A121S	MURATA
20					
21	1	R112	10M, RESISTOR, 0603, 5%	ERJ-3GSYJ394V	PANASONIC
22	1	R114	390K, RESISTOR, 0603, 5%	ERJ-3GSYJ104V	PANASONIC
23	1	R105	100K, RESISTOR, 0603, 5%	ERJ-3GSYJ153V	PANASONIC
24	4	R106, R107, R108, R111	15K, RESISTOR, 0603, 5%	ERJ-3GSYJ912V	PANASONIC
25	1	R116	9.1K, RESISTOR, 0603, 5%	ERJ-3GSYJ822V	PANASONIC
26	1	R115	8.2K, RESISTOR, 0603, 5%	ERJ-3GSYJ392V	PANASONIC
27	1	R113	3.9K, RESISTOR, 0603, 5%	ERJ-3GSYJ751V	PANASONIC
28	1	R101	750, RESISTOR, 0630, 5%	ERJ-3GSYJ561V	PANASONIC
29	1	R110	560, RESISTOR, 0603, 5%	ERJ-3GSYJ331V	PANASONIC
30	2	R99, R100	330, RESISTOR, 0603, 5%	ERJ-3GSYJ500V	PANASONIC
31	1	R119	50, RESISTOR, 0603, 5%	ERJ-3GSYJ100V	PANASONIC
32	2	R128, R129	10, RESISTOR, 0603, 5%	RM73Z1J000ZT	ERJ KOA
33	8	R102, R103, R104, R109, R117, R118, R120, R127, R121, R122, R123, R124, R125, R126	0, RESISTOR, 0603, 5%	3GSYJ000V	PANASONIC
34	6	U10	TBD, RESISTOR, 0603, 5%	R	PANASONIC
35	1		SRAM	KM62256DLTG-5L	SAMSUNG
36	1	U12	MAC	M5M5256CVP-55LL AM79C930	MITSUBUSHI AMD

FIG.46B

37	1	U13	BASEBAND PROCESSOR	HFA3842A1	HARRIS
38	1	U14	FLASH RAM	AM29F010-55EC	AMD
39	1	U15	32 KHz CRYSTAL	CX-6V-SM2-32.768KHzC/1	STATEK
40	2	U45	BUS BUFFER	DS3862	NATIONAL
41	1	U48	REGULATOR 3.5 V	TK11235BMC	TOKO
42	1	U49	22MHz OSCILLATOR	FOX F3346-22MHz	FOX
43	1	U50	2 VOLT REFERENCE	TK11220BMC	TOKO
44	1	U51	40MHz OSCILLATOR	CXO-M-10N-40MHz A/1	STATEK

FIG. 46C

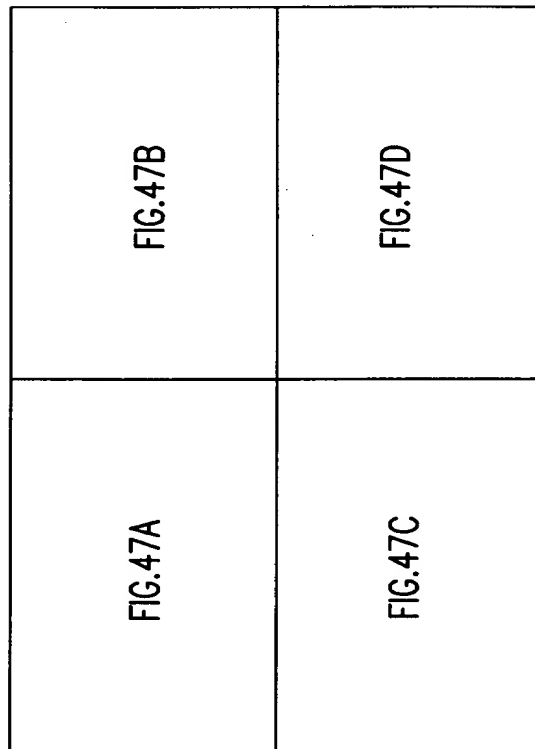


FIG. 47

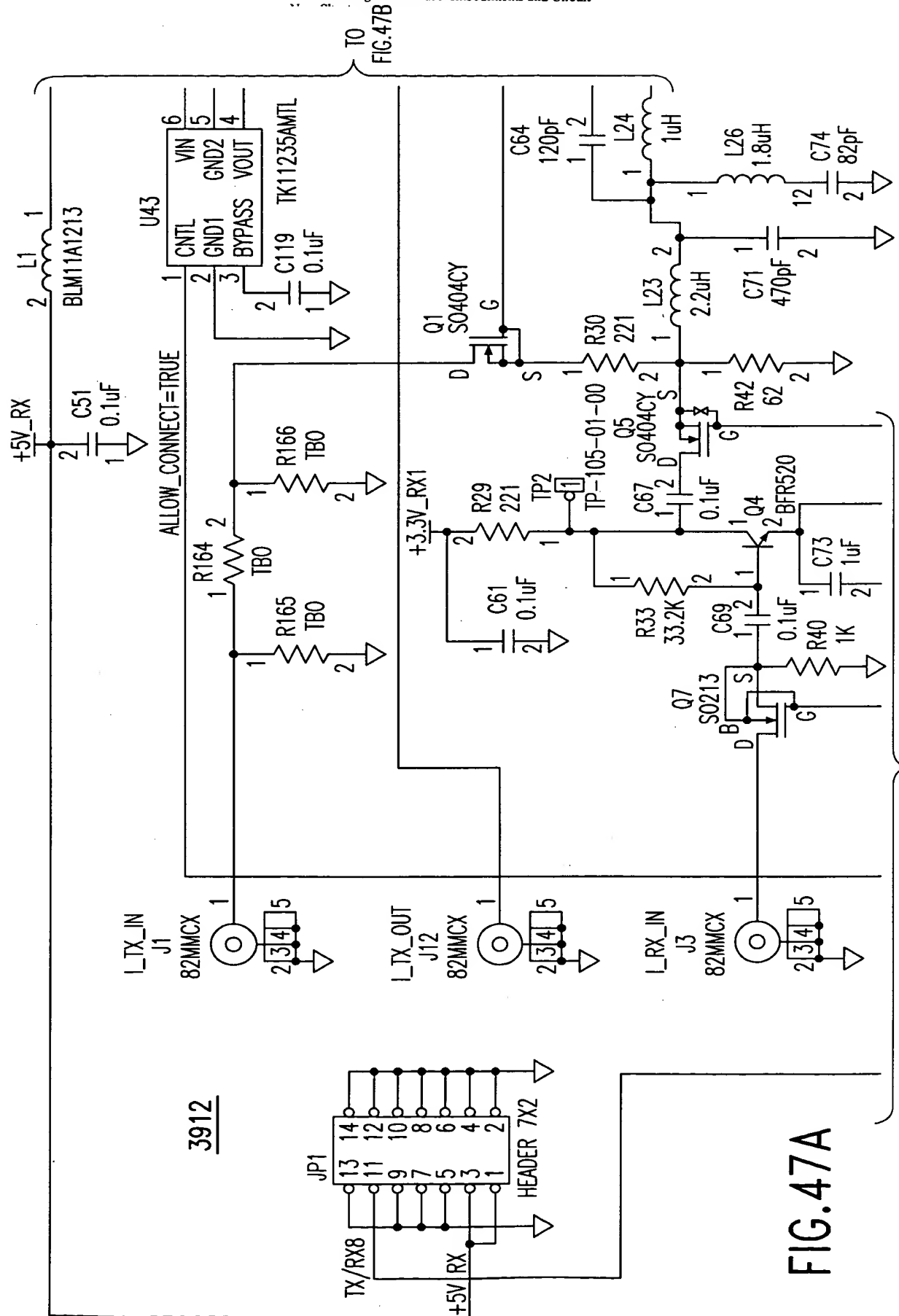


FIG. 47B

T0

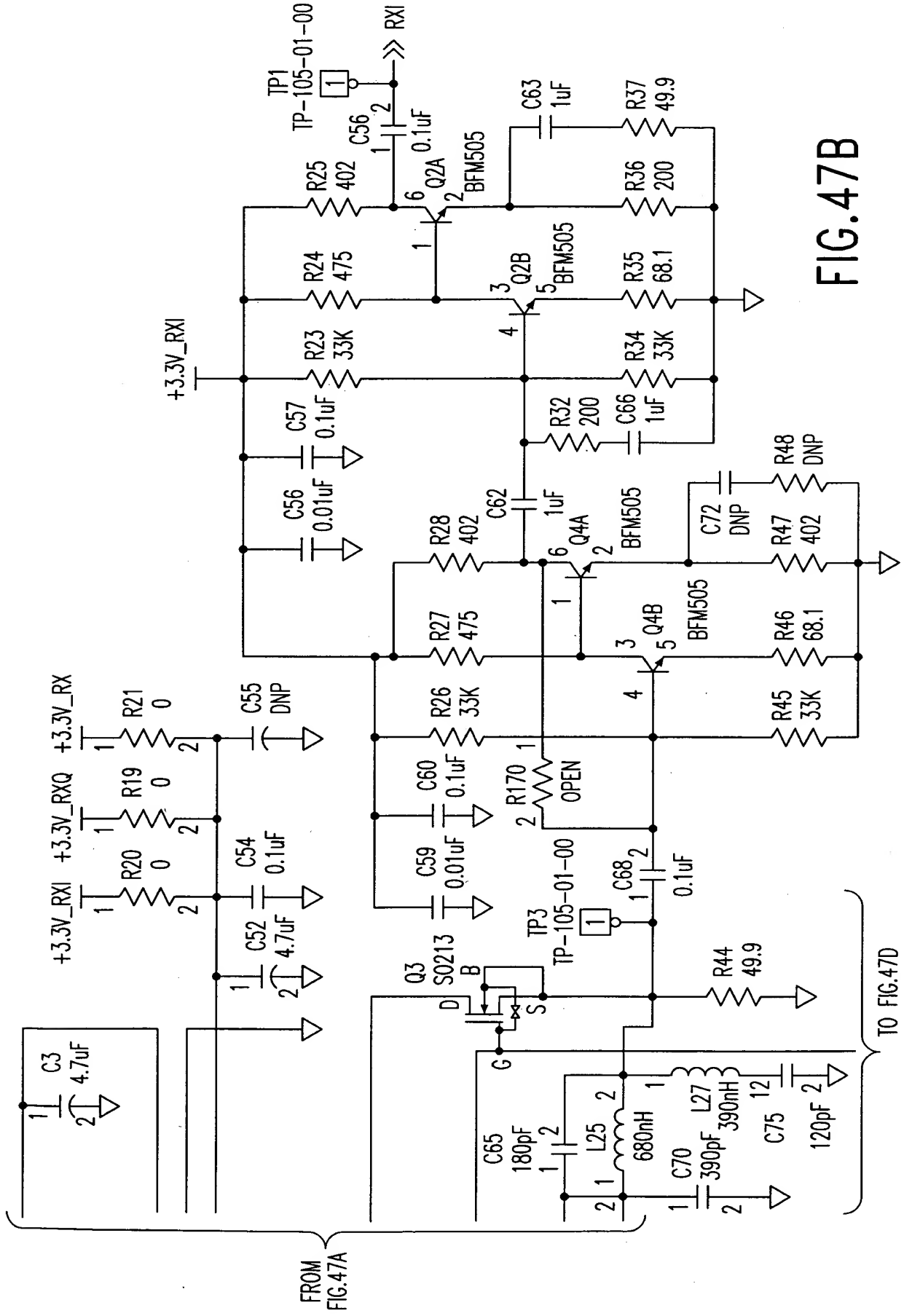
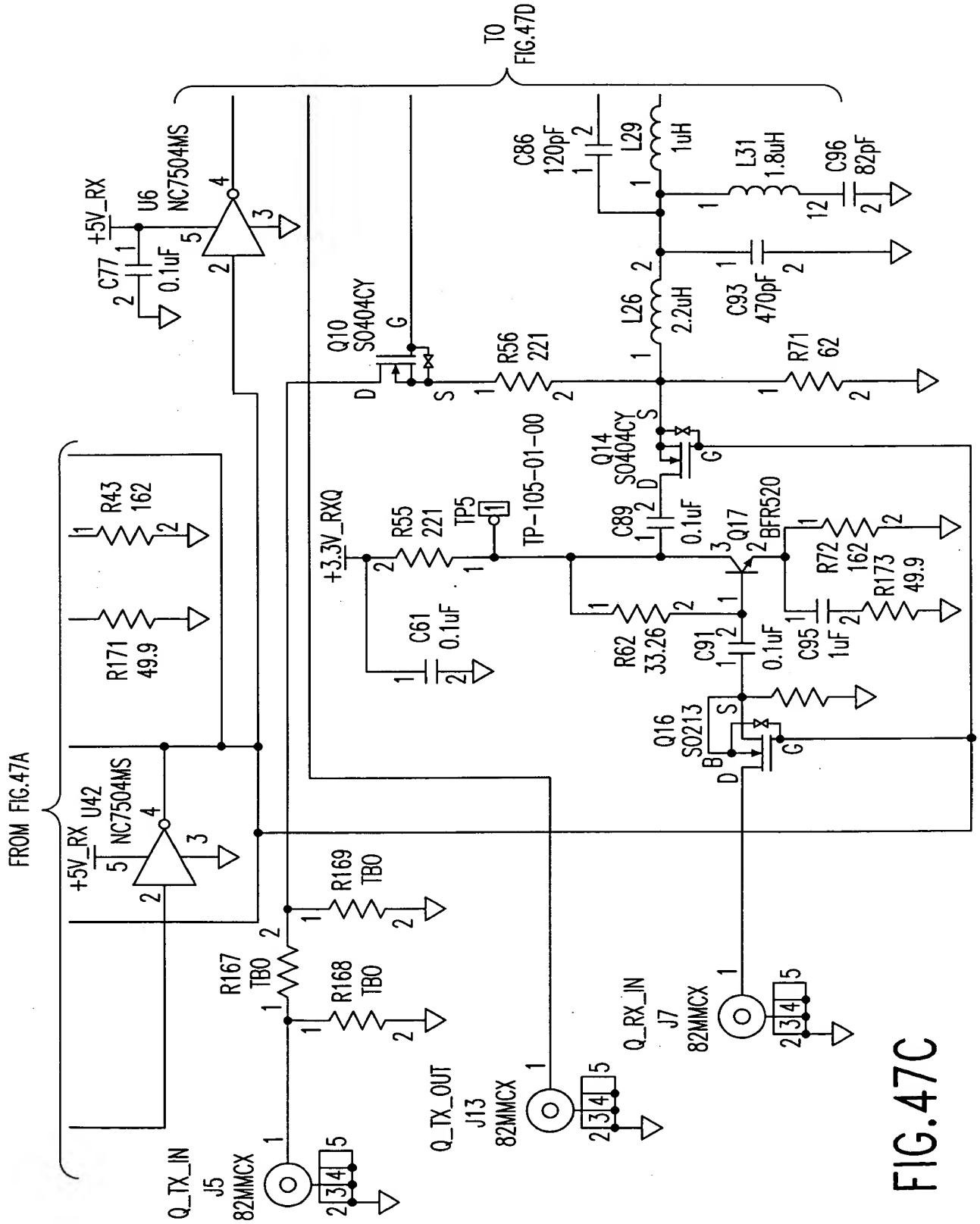
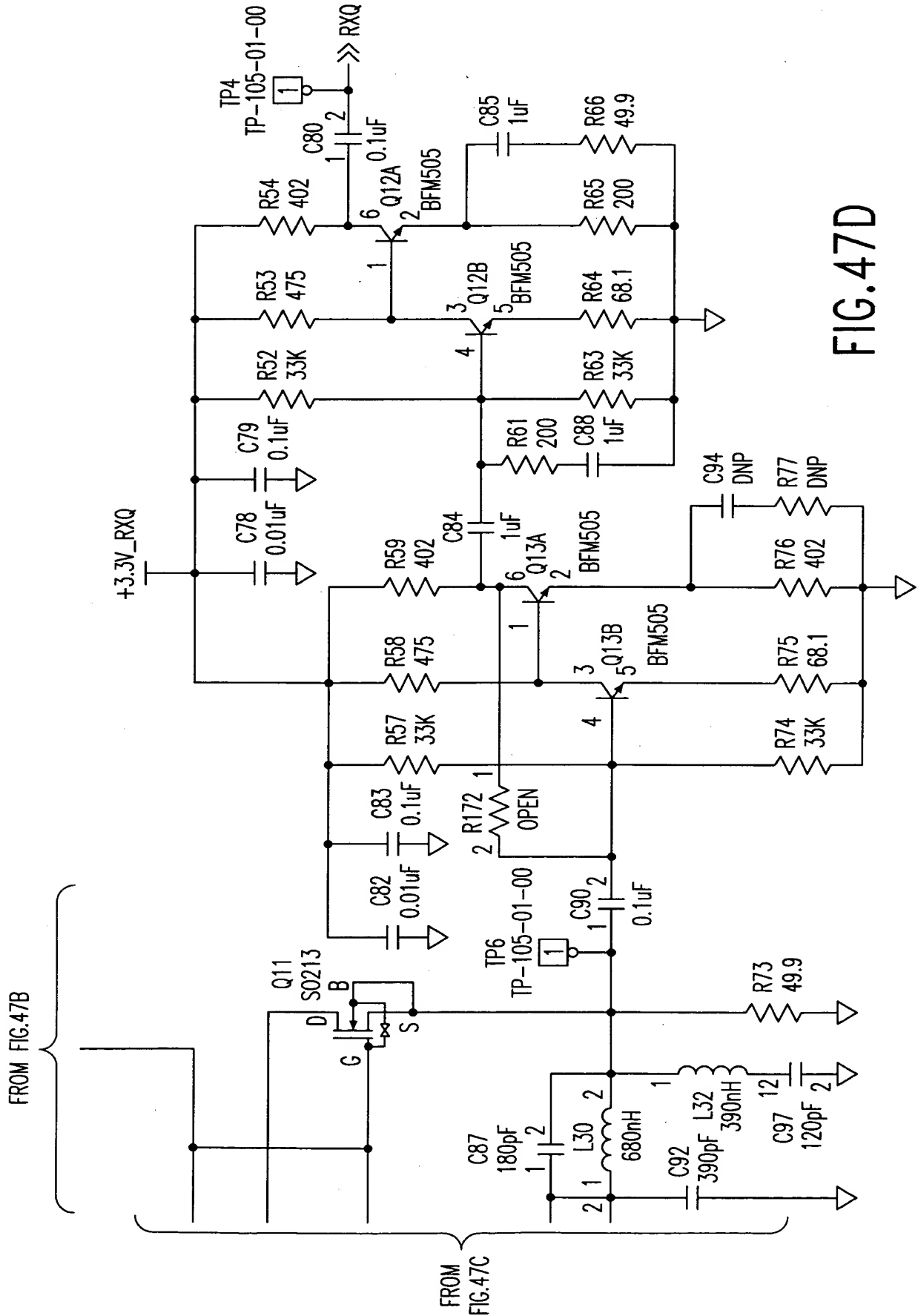


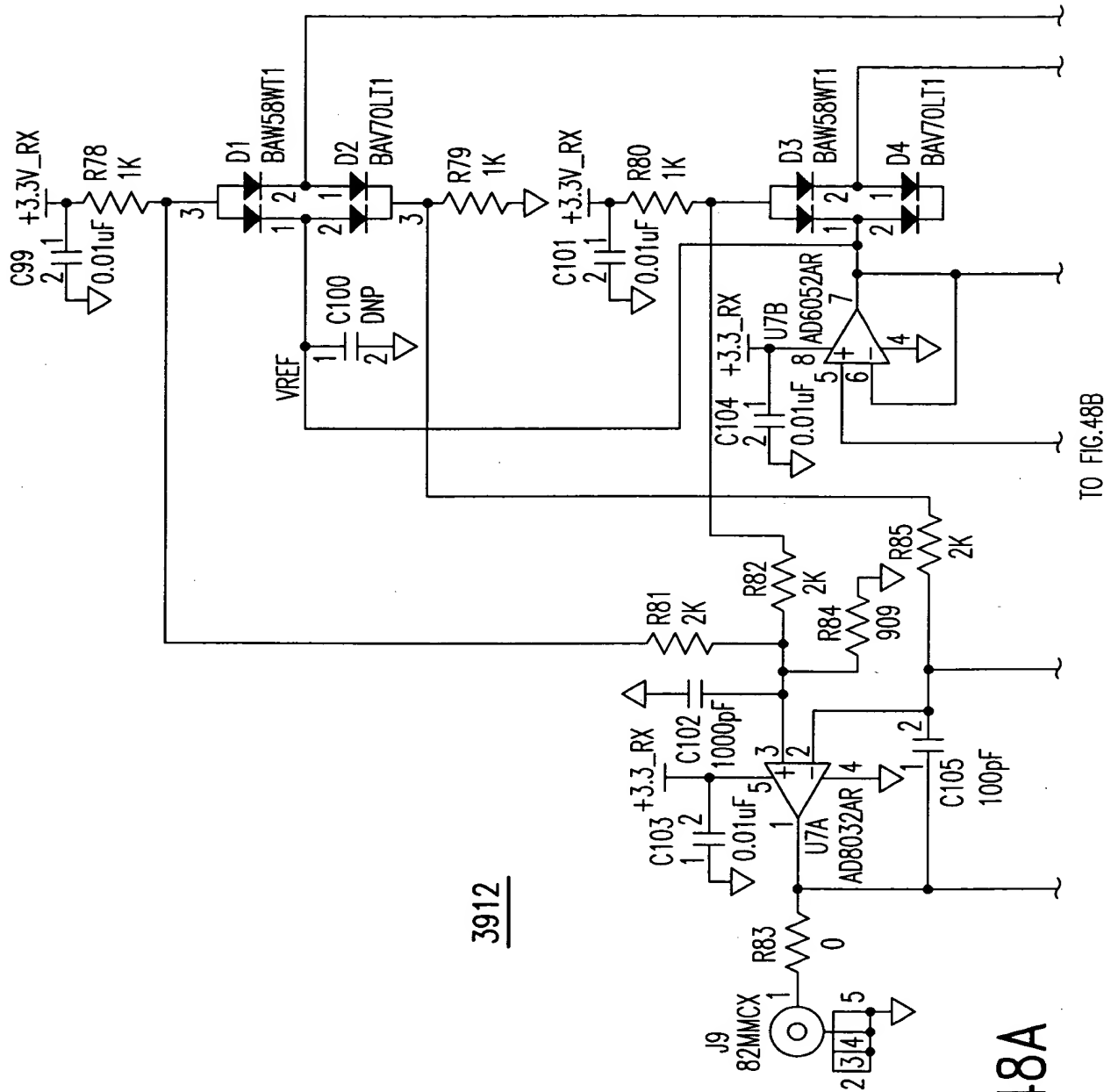
FIG.47B

TO FIG.47D









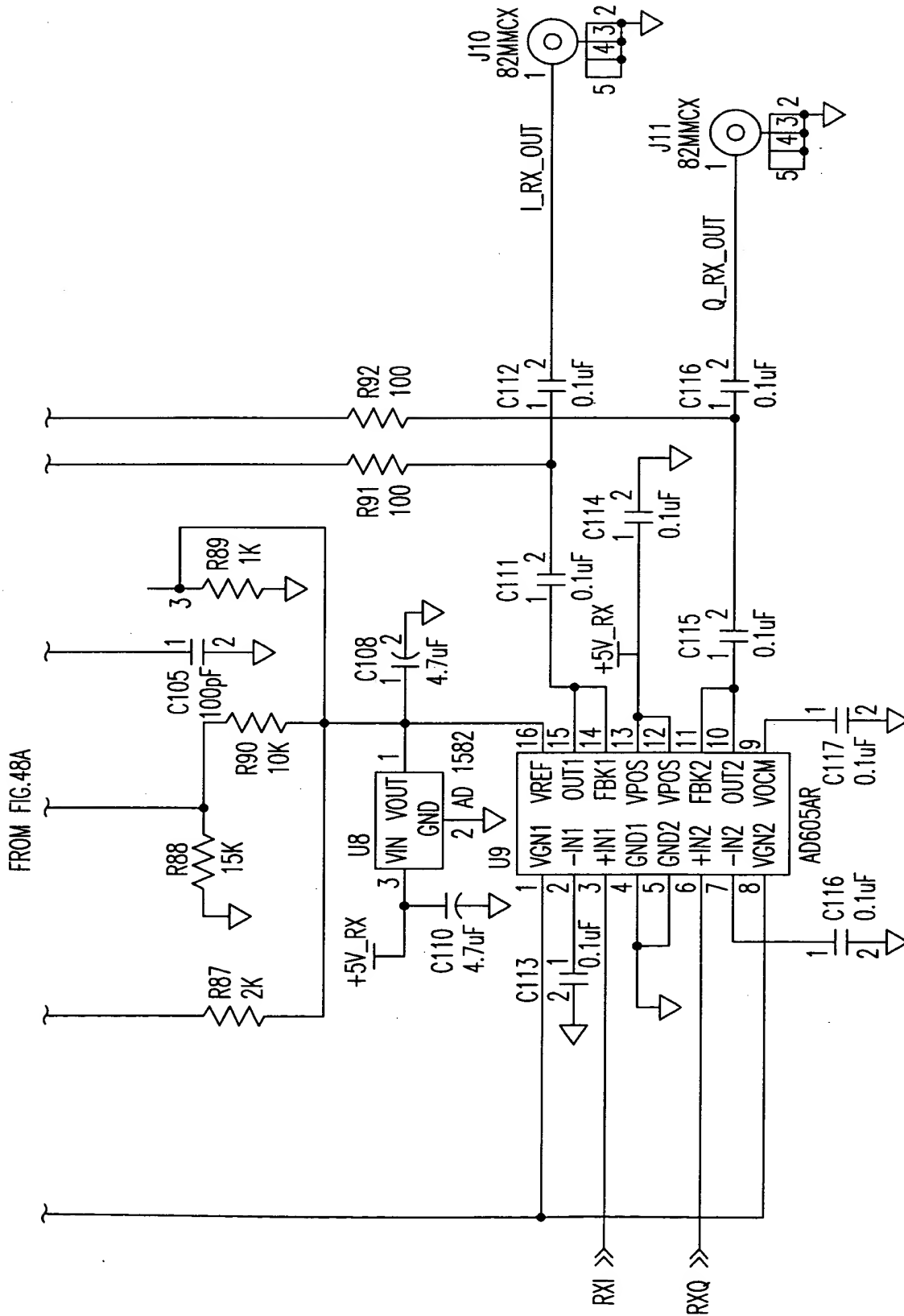


FIG. 48B

ITEM	QUANT.	REFERENCE	PART	PART NUMBER	MANUFACTURER
1	4	C3, C52, C108, C110	4.7uF	T491A475K006AS	KEMET
2	26	C51, C54, C57, C58, C60, C61, C67, C68, C69, C77, C79, C80, C81, C83, C89, C90, C91, C111, C112, C113, C114, C115, C116, C117, C118, C119	0.1uF	GRM39Y5V104Z016	MURATA
3	1	C55	DNP	T491A475K006AS	KEMET
4	8	C56, C59, C78, C82, C99, C101, C103, C104	0.01uF	GRM39X7R103K050	MURATA
5	8	C62, C63, C66, C73, C84, C85, C88, C95	1uF	GRM40Y5V105Z016	MURATA
6	4	C64, C75, C86, C97	120pF	GRM39CCG121J050	MURATA
7	2	C65, C87	180pF	GRM39CCG181J050	MURATA
8	2	C70, C92	390pF	GRM39CCG391J050	MURATA
9	2	C71, C93	470pF	GRM39CCG471J050	MURATA
10	2	C72, C94	DNP	GRM40Y5V105Z016	MURATA
11	2	C74, C96	82pF	GRM39CCG820J050	MURATA
12	2	C100, C106	DNP	DNP	MURATA
13	2	C105, C102	1000pF	GRM39CCG102K050	MURATA
14	2	D3, D1	BAW56WT1	BAW56WT1	MOTOROLA
15	2	D4, D2	BAV70LT1	BAV70LT1	MOTOROLA
16	1	JP1	HEADER 7X2	FTSH-107-02-L-D	SAMTEC
17	9	J1, J3, J5, J7, J9, J10, J11, J12, J13	82uMCX	82uMCX-50-0-1	SUHRER
18	1	L1	BLM11A121S	BLM11A121S	MURATA
19	2	L23, L28	2.2uH	LQ321N2R2K10	MURATA
20	2	L29, L24	1uH	LQ321N1R0K10	MURATA
21	2	L30, L25	680nH	LQ321NR68K10	MURATA

FIG. 49A

22	2	L26, L31	1.8uH	LQ21N1R8K10	MURATA
23	2	L32, L27	390nH	LQ21NR39K10	MURATA
24	4	Q1, Q5, Q10, Q14	SD404CY	SD404CY	CALOGIC
25	4	Q2, Q4, Q12, Q13	BFM505	BFM505	PHILIPS
26	4	Q3, Q7, Q11, Q16	SD213	SD213	CALOGIC
27	2	Q17, Q8	BFR520	BFR520	PHILIPS
28	4	R19, R20, R21, R83	0	ERJ3GSY0R00	PANASONIC
29	8	R23, R26, R34, R45, R52, R57, R63, R74	33K	ERJ3GSYJ333	PANASONIC
30	4	R24, R27, R53, R58	475	ERJ3EKF4750	PANASONIC
31	6	R25, R28, R47, R54, R59, R76	402	ERJ3EKF4020	PANASONIC
32	4	R29, R30, R55, R56	221	ERJ3EKF2210	PANASONIC
33	2	R32, R61	200	ERJ3GSYJ201	PANASONIC
34	2	R33, R62	33.2K	ERJ3GSYJ333	PANASONIC
35	4	R35, R46, R64, R75	68.1	ERJ3EKF68R1	PANASONIC
36	2	R36, R65	200	ERJ3EKF2000	PANASONIC
37	6	R37, R44, R66, R73, R171, R173	49.9	ERJ3EKF49R9	PANASONIC
38	6	R40, R68, R78, R79, R80, R89	1K	ERJ3EKF1001	PANASONIC
39	2	R42, R71	62	ERJEGSYJ620	PANASONIC
40	2	R43, R72	162	ERJ3EKF1620	PANASONIC
41	2	R77, R48	DNP	ERJ3GSYJ330	PANASONIC
42	4	R81, R82, R85, R87	2K	ERJ3EKF2001	PANASONIC
43	1	R84	909	ERJ3EKF9090	PANASONIC
44	1	R88	15K	ERJ3EJF1502	PANASONIC
45	1	R90	10K	ERJ3EKF1002	PANASONIC
46	2	R91, R92	100	ERJ3EKF1000	PANASONIC
47	6	R164, R165, R166, R167, R168, R169	TBD		PANASONIC
48	2	R170, R172	OPEN		PANASONIC

FIG. 49B

49	6	TP1, TP2, TP3, TP4, TP5, TP6	TP-105-01-00		
50	2	U42, U6	NC7S04M5	NC7S04M5	NATIONAL SEMICONDUCTOR
51	1	U7	AD8052AR	AD8052AR	ANALOG DEVICES
52	1	U8	AD1582	AD1582	ANALOG DEVICES
53	1	U9	AD605AR	AD605AR	ANALOG DEVICES
54	1	U43	TK11235AMTL	TK11235BM	TOKO
55	1		BOARD	8500.541.003.V13.01	

FIG. 49C

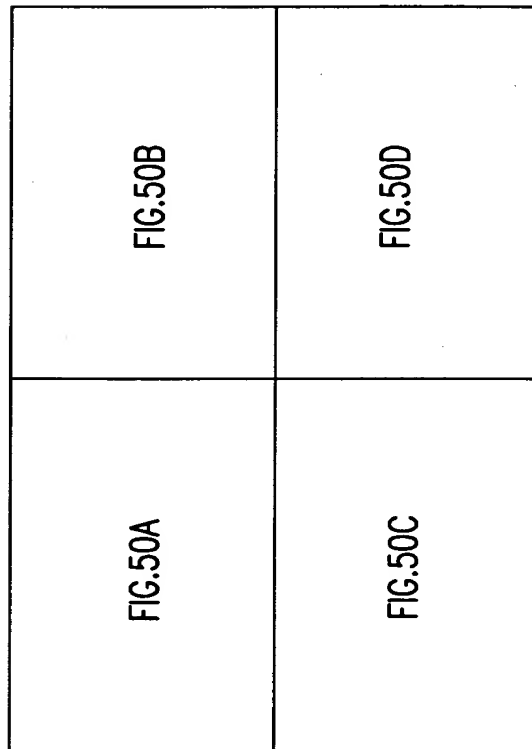
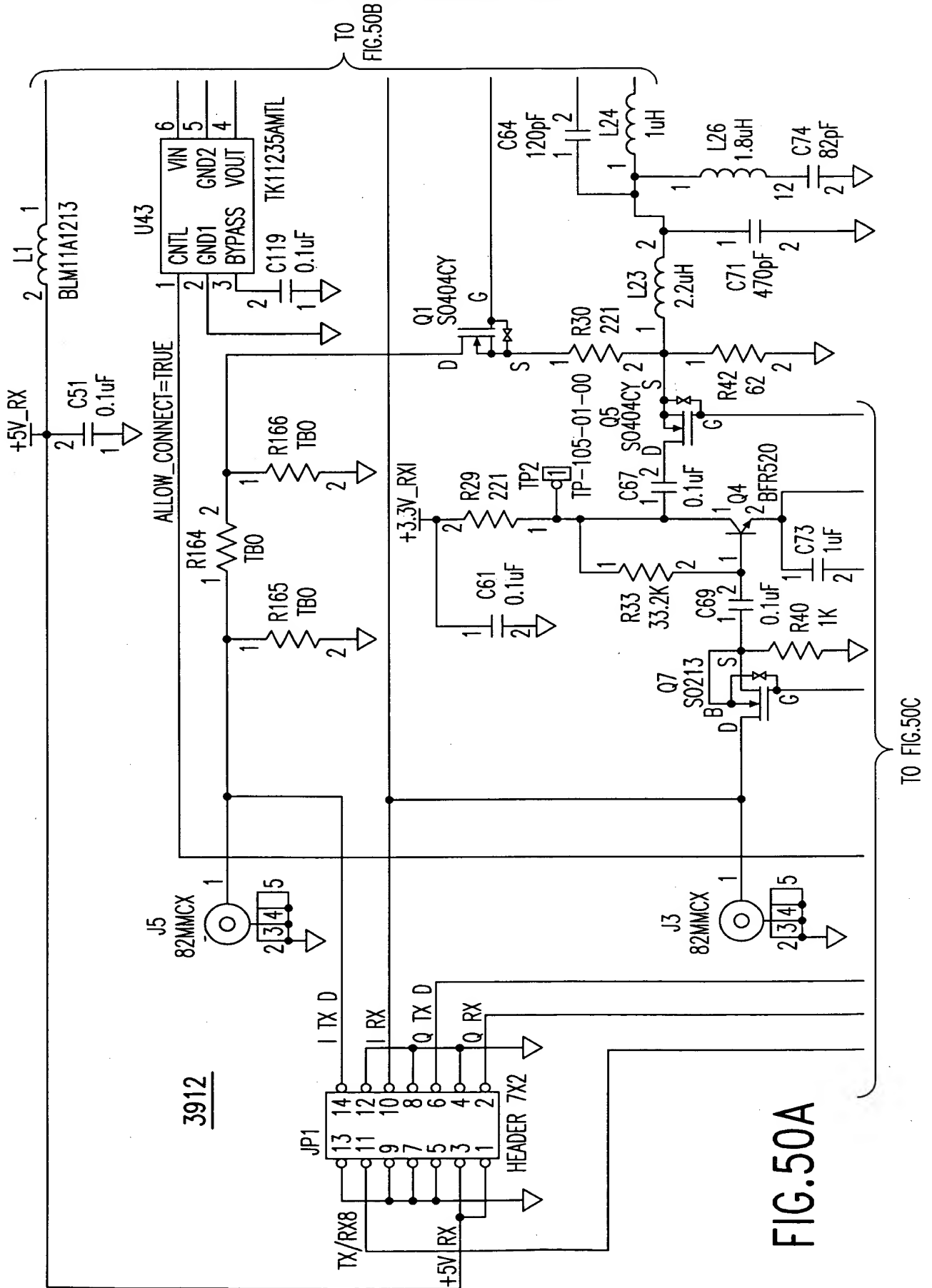


FIG. 50



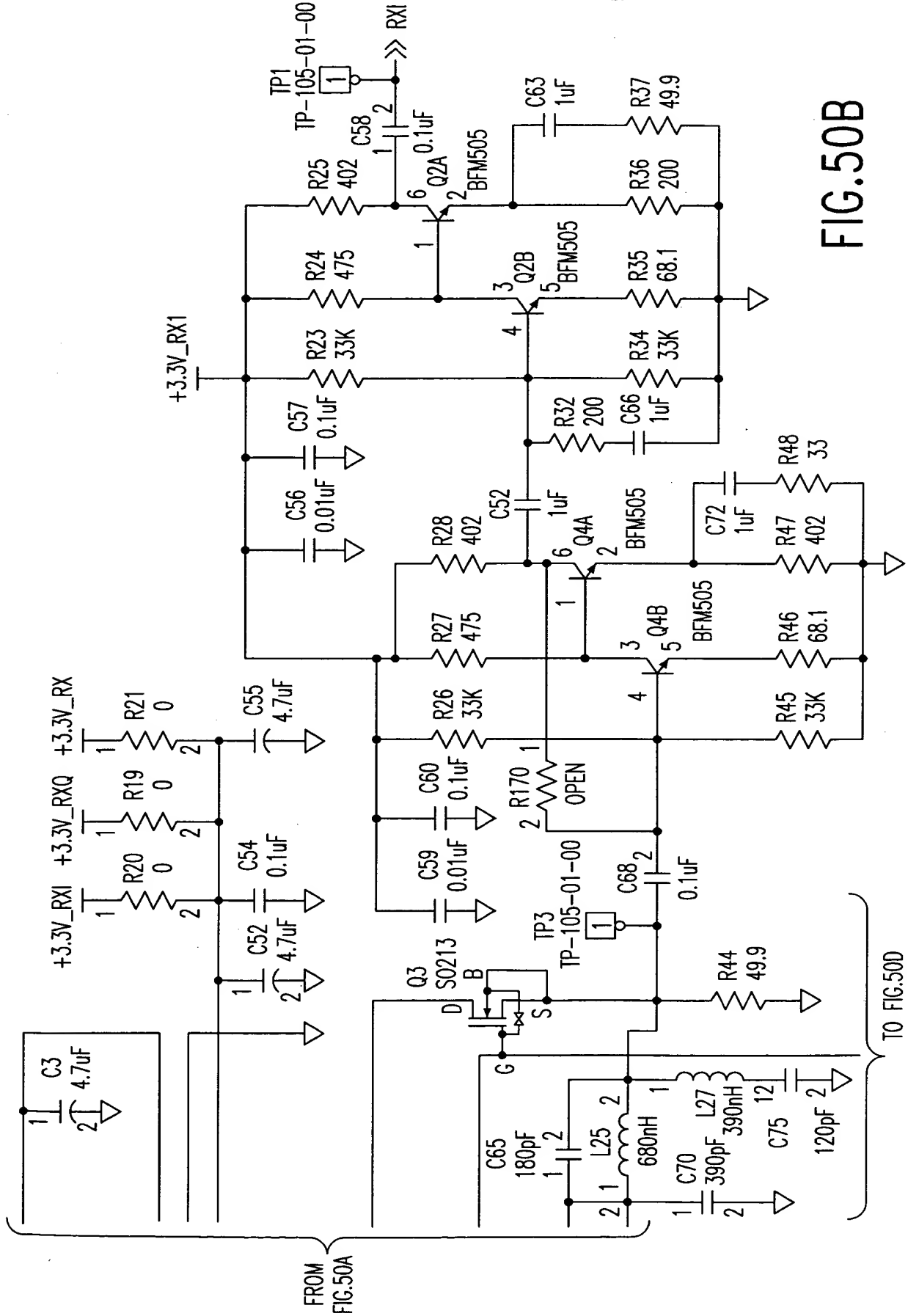


FIG. 50B



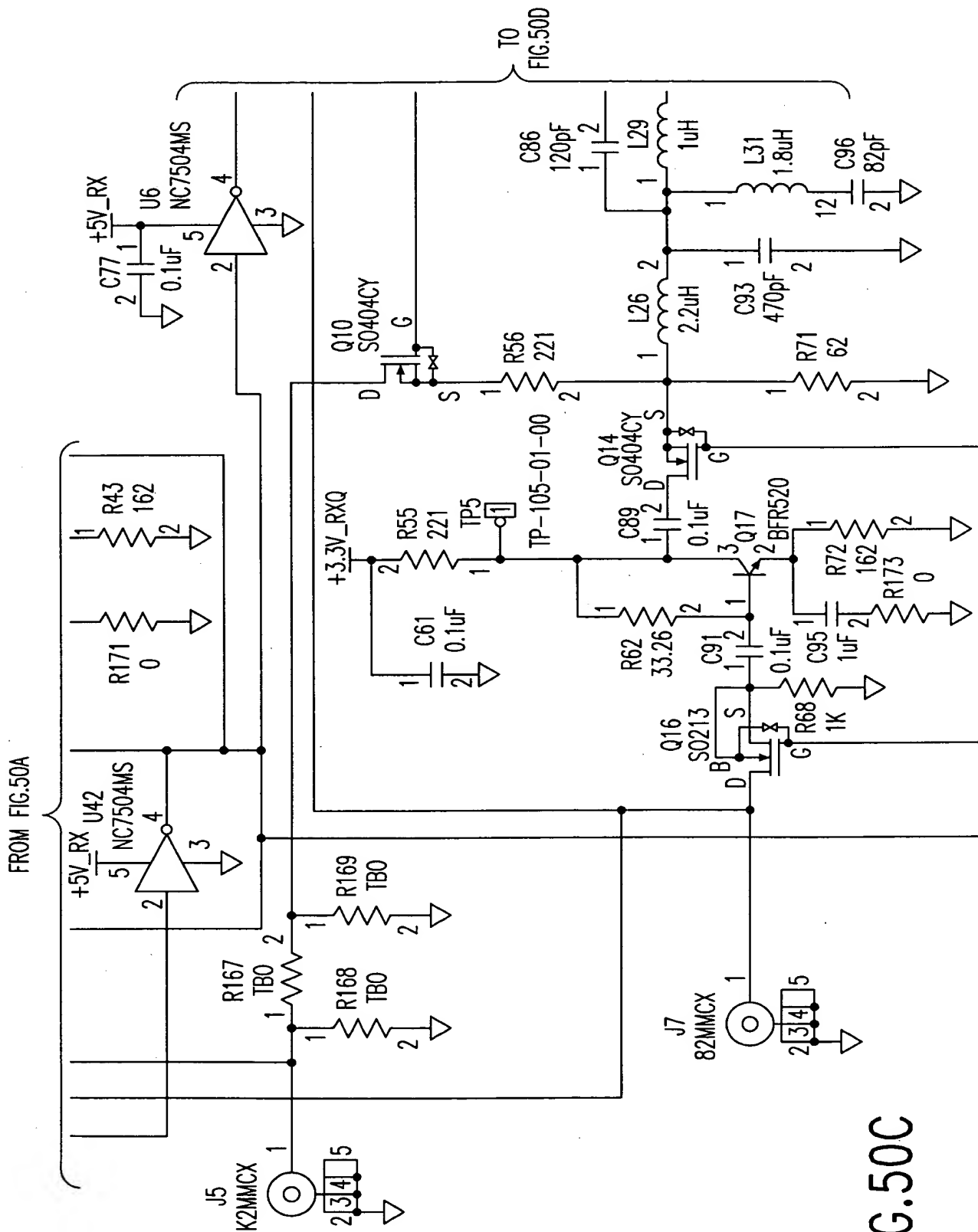
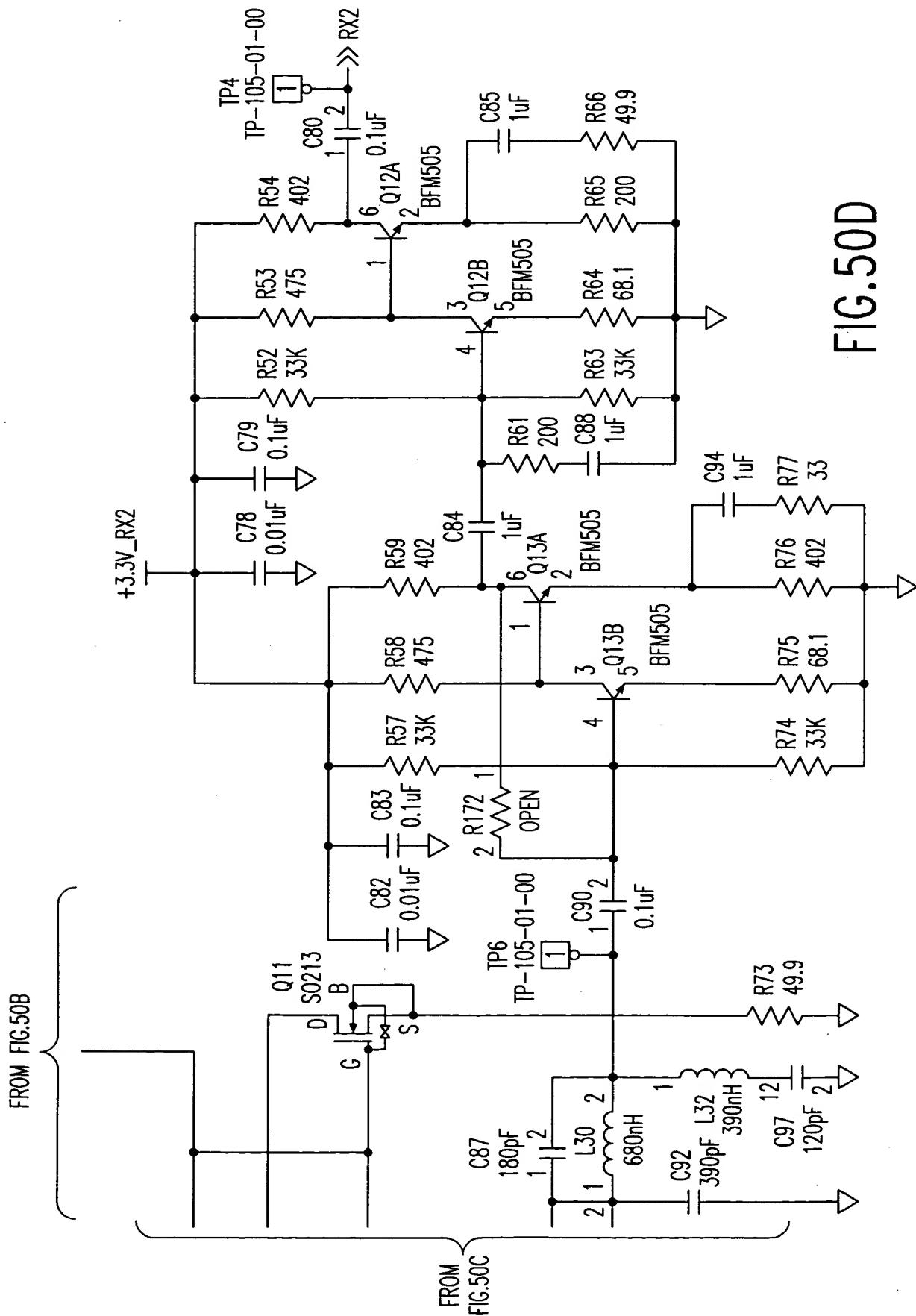
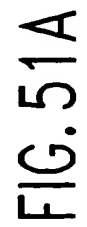


FIG.50C







**FIG. 51B**

ITEM	QTY	REFERENCE	PART	PART NUMBER	MANUFACTURER
1	3	C3, C52, C55	4.7uF	T491A475K006AS	KEMET
2	26	C51, C54, C57, C58, C60, C61, C67, C68, C69, C77, C79, C80, C81, C83, C89, C90, C91, C111, C112, C113, C114, C115, C116, C117, C118, C119	0.1uF	GRM39Y5V104Z016	MURATA
3	8	C56, C59, C78, C82, C99, C101, C103, C104	0.01uF	GRM39X7R103K050	MURATA
4	10	C62, C63, C66, C72, C73, C84, C85, C88, C94, C95	1uF	GRM40Y5V105Z016	MURATA
5	4	C64, C75, C86, C97	120pF	GRM39CGG121J050	MURATA
6	2	C87, C65	180pF	GRM39CGG181J050	MURATA
7	2	C70, C92	390pF	GRM39CGG391J050	MURATA
8	2	C71, C93	470pF	GRM39CGG471J050	MURATA
9	2	C96, C74	82pF	GRM39CGG820J050	MURATA
10	5	C100, C102, C105, C106, C107	100pF	GRM39CGG101K050	MURATA
11	1	C108	1uF		
12	1	C110	4.7uF		
13	2	D3, D1	BAW56WT1	BAW56WT1	MOTOROLA
14	2	D4, D2	BAV70LT1	BAV70LT1	MOTOROLA
15	2	JP2, JP1	HEADER 7X2		
16	6	J1, J3, J5, J7, J10, J11	82MCMX	142-0701-231	JOHNSON
17	1	J9	82MCMX	82MCMX-50-0-1	SUHRER
18	1	L1	BLM11A121S	BLM11A121S	MURATA
19	2	L28, L23	2.2uH	LQG21N2R2K10	MURATA
20	2	L24, L29	1uH	LQG21N1R0K10	MURATA
21	2	L30, L25	680nH	LQG21NR68K10	MURATA
22	2	L26, L31	1.8uH	LQG21N1R8K10	MURATA

FIG. 52A

23	2	L27, L32	390nH	LQ21NR39K10	MURATA
24	4	Q1, Q5, Q10, Q14	SD404CY	SD404CY	CALOGIC
25	4	Q2, Q4, Q12, Q13	BFM505	BFM505	PHILIPS
26	4	Q3, Q7, Q11, Q16	SD213	SD213	CALOGIC
27	2	Q17, Q8	BFR520	BFR505	PHILIPS
28	5	R19, R20, R21, R171, R173	0		
29	8	R23, R26, R34, R45, R52, R57, R63, R74	33K	ERJ3G5Y333	PANASONIC
30	4	R24, R27, R53, R58	475	ERJ3KEF4750	PANASONIC
31	6	R25, R28, R47, R54, R59, R76	402	ERJ3KEF4020	PANASONIC
32	4	R29, R30, R55, R56	221	ERF3KEF2210	PANASONIC
33	2	R32, R61	200	ERJ3G5YJ201	PANASONIC
34	2	R33, R62	33.2K	ERJ3G5YJ333	PANASONIC
35	4	R35, R46, R64, R75	68.1	ERJ3KEF68R1	PANASONIC
36	2	R36, R65	200	ERJ3KEF2000	PANASONIC
37	2	R66, R37	49.9	ERJ3KEF49R9	PANASONIC
38	6	R40, R68, R78, R79, R80, R89	1K	ERJ3KEF1001	PANASONIC
39	2	R42, R71	62	ERJ3G5YJ620	PANASONIC
40	2	R43, R72	162	ERJ3KEF6810	PANASONIC
41	2	R44, R73	49.9	ERJ3KEF1001	PANASONIC
42	2	R77, R48	33	ERJ3G5YJ330	PANASONIC
43	4	R81, R82, R85, R87	2K	ERJ3KEF2001	PANASONIC
44	1	R83	0	ERJGSY0R00	PANASONIC
45	1	R84	1.1K	ERJ3KEF2001	PANASONIC
46	1	R88	15K	ERJ3KEF1502	PANASONIC
47	1	R90	10K	ERJ3KEF1002	PANASONIC
48	2	R91, R92	100	ERJ3KEF1000	PANASONIC
49	6	R164, R165, R166, R167, R168, R169	TBD		
50	2	R170, R172	OPEN		

FIG. 52B

51	0	TP1, TP2, TP3, TP4, TP5, TP6	TP-105-01-00		
52	2	U42, U6	NC7S04M5		NATIONAL SEMICONDUCTOR
53	1	U7	AD8032AR	AD8032AR	ANALOG DEVICES
54	1	U8	AD1582	AD1582	ANALOG DEVICES
55	1	U9	AD605AR	AD605AR	ANALOG DEVICES
56	1	U43	TK11235AMTL	TK11235AMTL	TOKO

FIG.52B-1

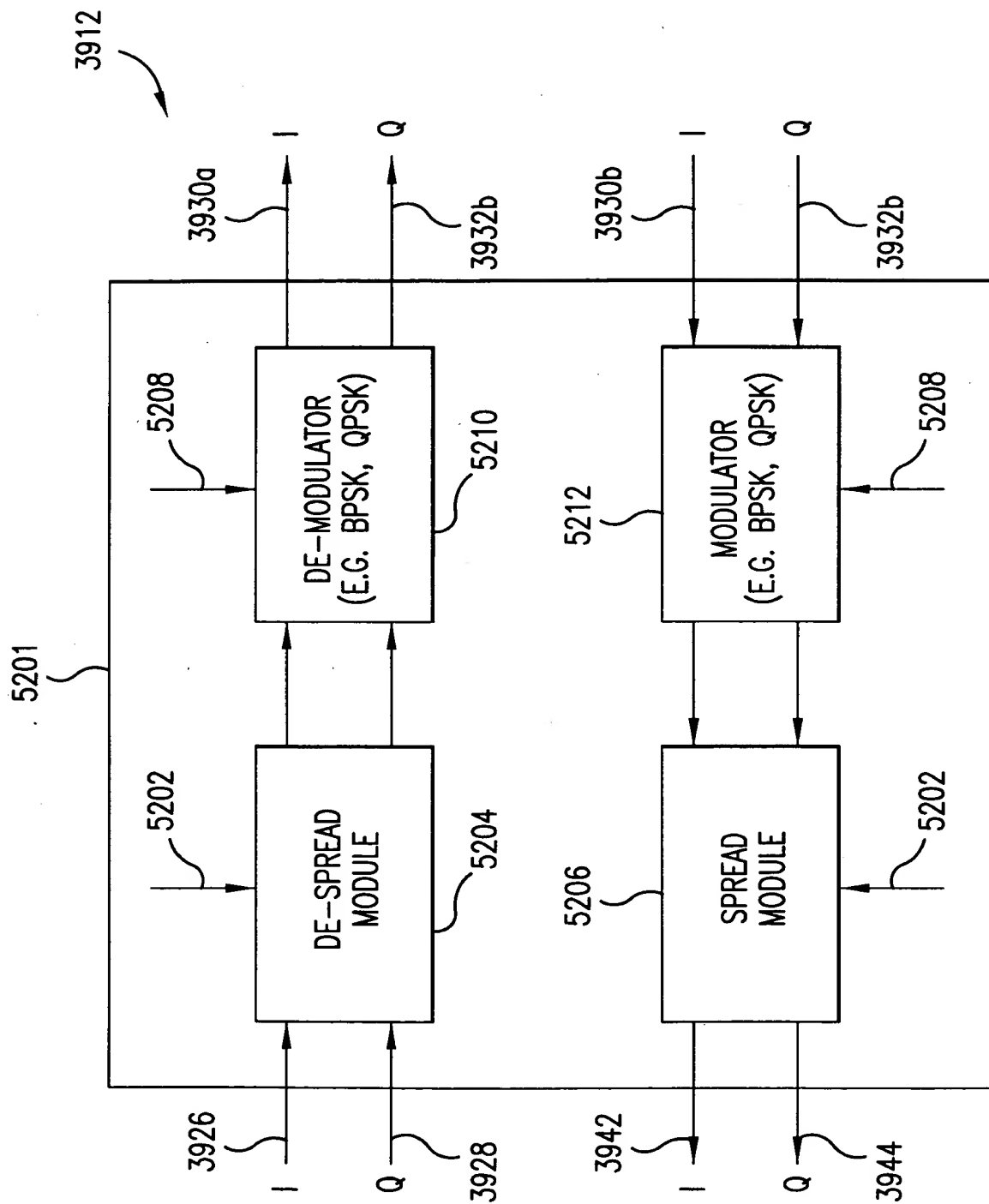
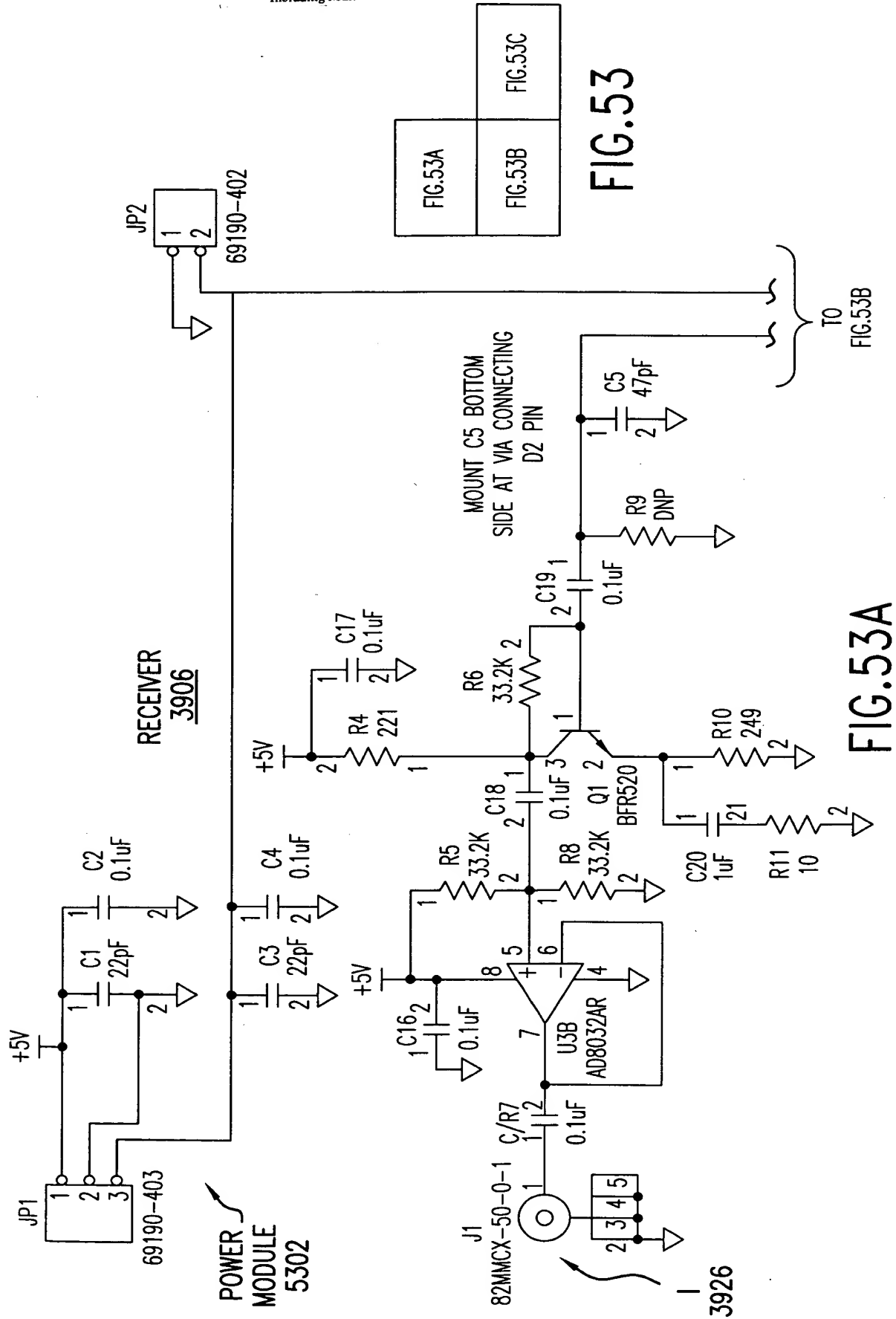


FIG. 52C





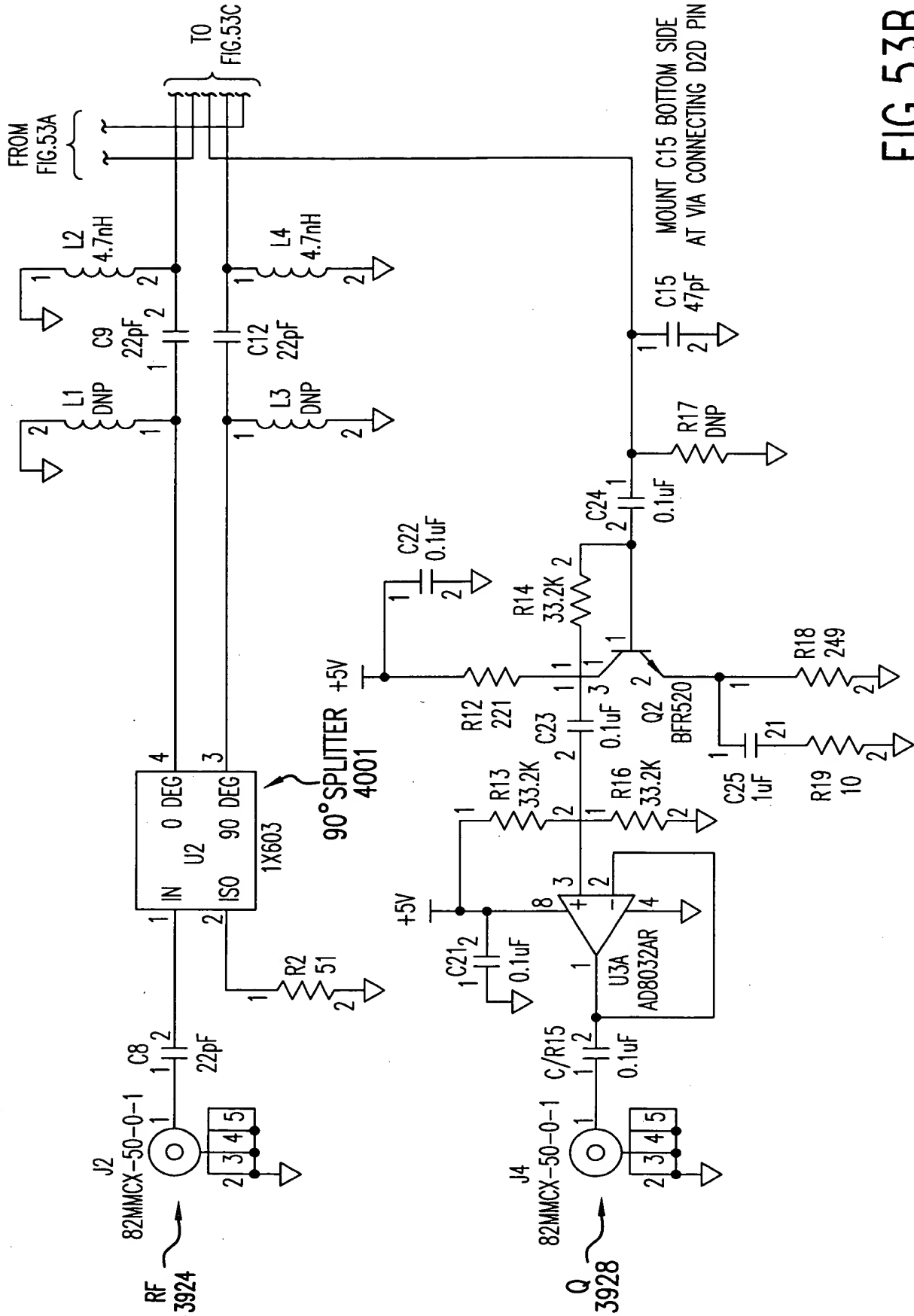


FIG. 53B

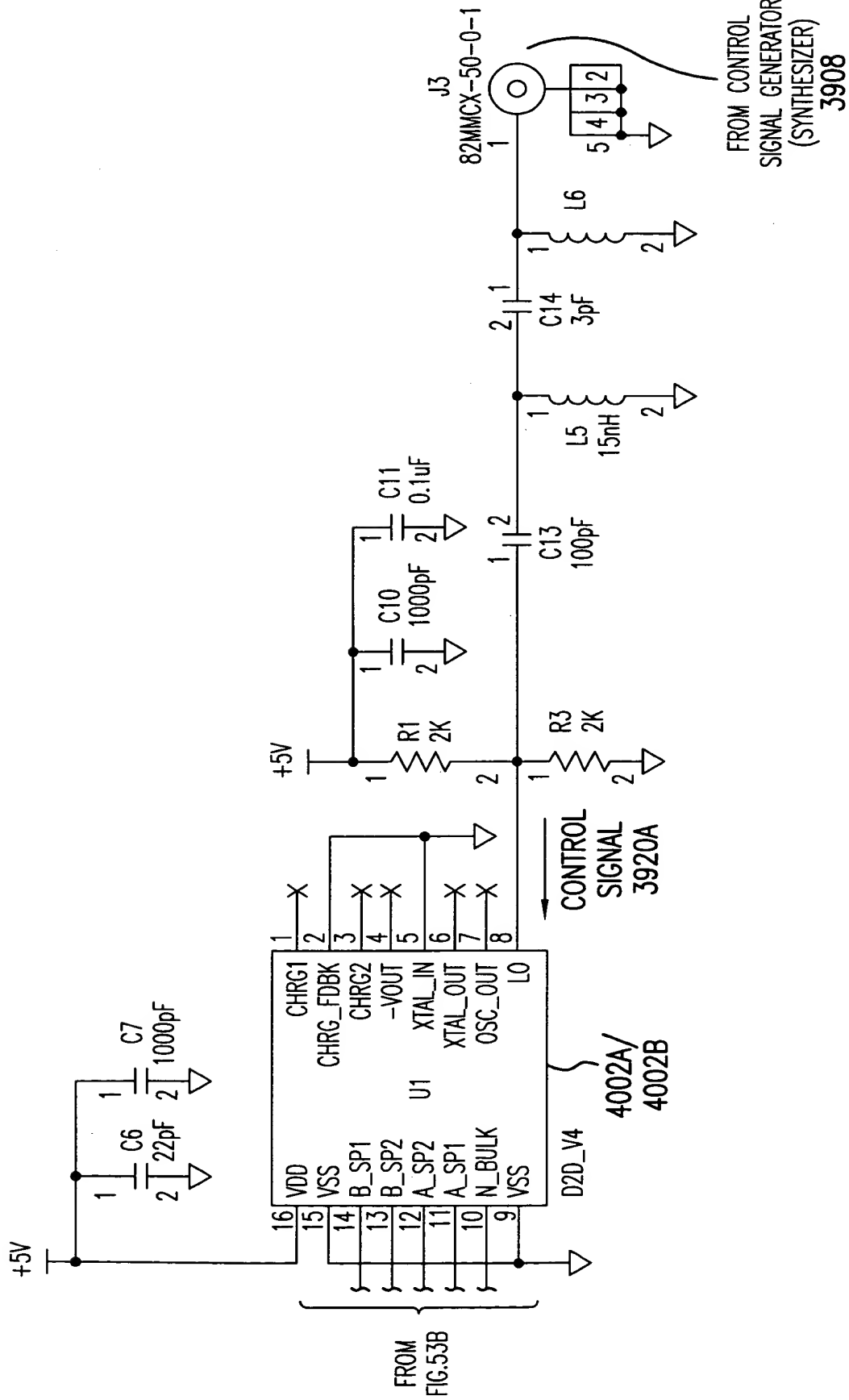


FIG. 53C

ITEM	QTY	REFERENCE	PART	PART NUMBER	MANUFACTURER
1	10	C/R7,C/R15,C16,C17,C18 C19,C21,C22,C23,C24	0.1uF	GRM39Y5V104Z016	MURATA
2	6	C1,C3,C6,C8,C9,C12	22pF	GRM39C0G220J050	MURATA
3	3	C2,C4,C11	0.1uF	GRM39X7R104K016	MURATA
4	2	C5,C15	47pF	GRM39C0G470J050	MURATA
5	2	C10,C7	1000pF	GRM39X7R102K050	MURATA
6	1	C13	100pF	GRM39X7R101J050	MURATA
7	1	C14	3pF	GRM40C0G30B50V	MURATA
8	2	C20,C25	1uF	GRM40Y5V105Z016	MURATA
9	1	JP1	69190-403	69190-403	BERG
10	1	JP2	69190-402	69190-402	BERG
11	4	J1,J2,J3,J4	82MMCX-50-0-1	82MMCX-50-0-1	SUHER
12	2	L3,L1	DNP	L	TOKO
13	2	L4,L2	4.7nH	LL1608-F4N7K	TOKO
14	1	L5	15nH	LL2012FH15NJ	TOKO
15	1	L6	DNP	DNP	TOKO
16	2	Q1,Q2	BFR520	BFR520	PHILIPS
17	2	R1,R3	2K	ERJ3GSYJ202	PANASONIC
18	1	R2	51	ERJ3GSYJ510	PANASONIC
19	2	R4,R12	221	ERJ3EKF2210	PANASONIC
20	6	R5,R6,R8,R13,R14,R16	33.2K	ERJ3EKF3322	PANASONIC
21	2	R9,R17	DNP	ERJ3EKF1001	PANASONIC
22	2	R10,R18	249	ERJ3EKF2490	PANASONIC
23	2	R11,R19	10	ERJ3GSYJ100	PANASONIC
24	1	U1	D2D_V4	D2D_V4	PARKER VISION
25	1	U2	1X603	1X603	ANAREN
26	1	U3	AD8032AR	AD8032AR	ANALOG DEVICES
27	1		BOARD	STB500.641.001 V03.00	

FIG.54

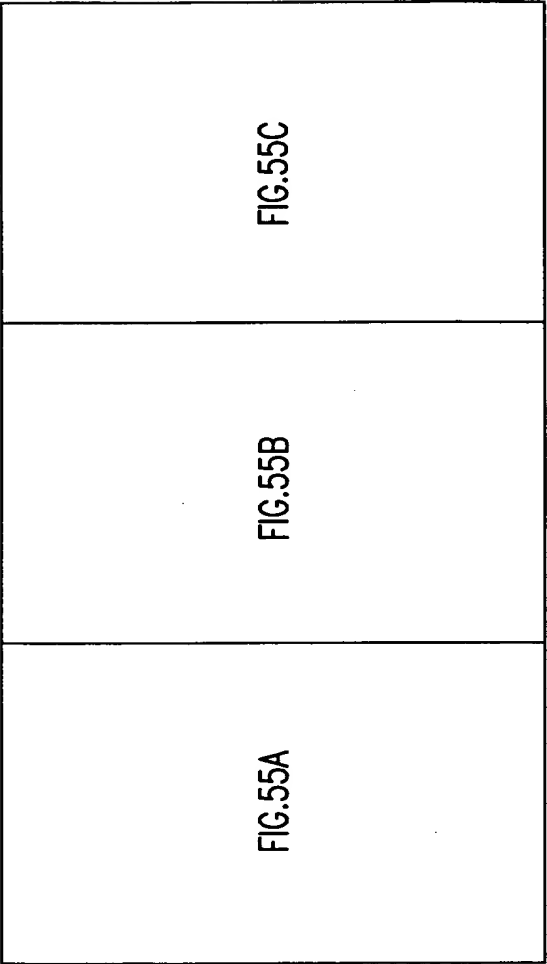


FIG. 55

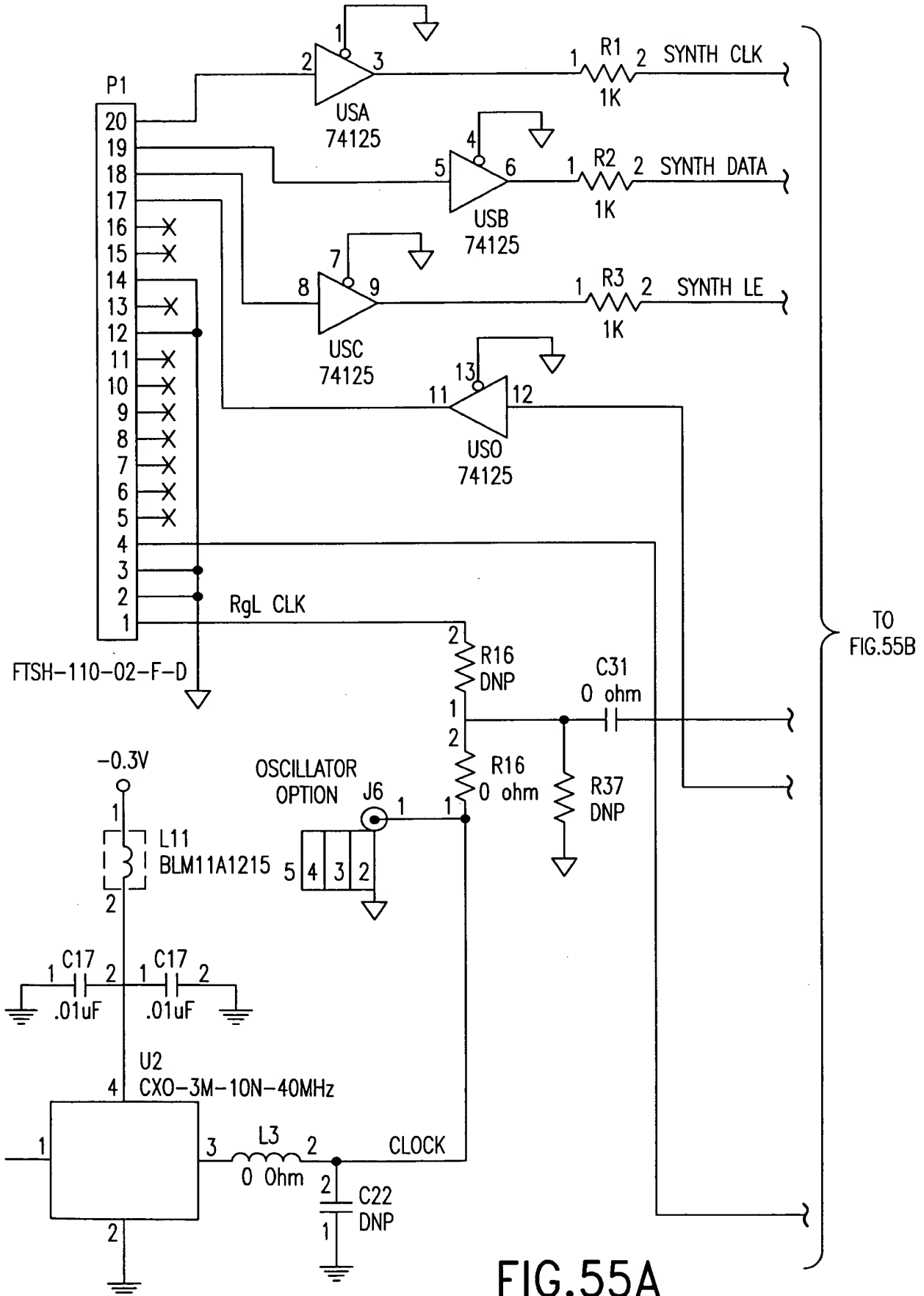


FIG.55A

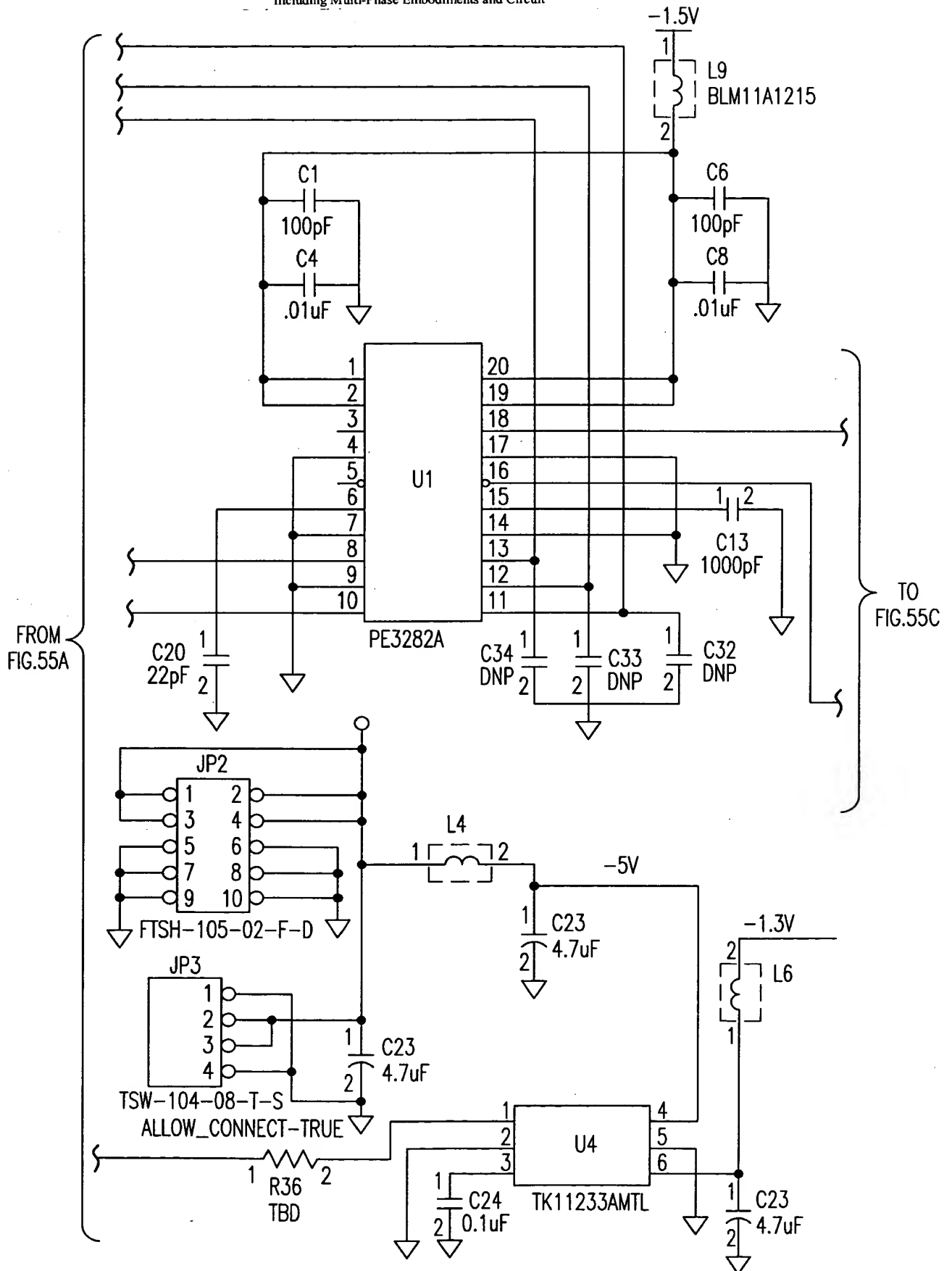


FIG.55B

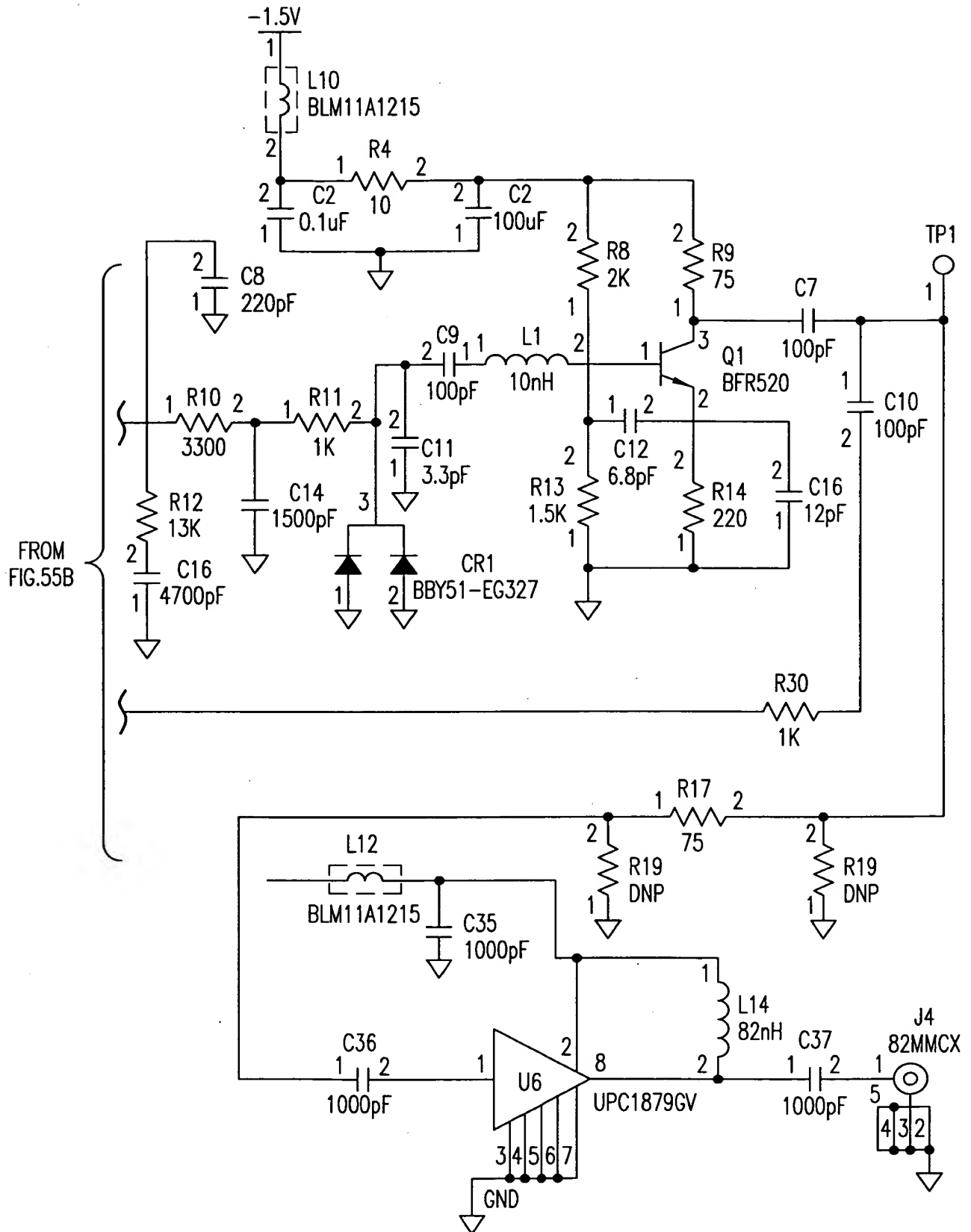


FIG. 55C



ITEM QTY	REFERENCE	PART	DESCRIPTION	PART NUMBER	MANUFACT.
1	CR1	BBY51-E6327	DIODE, VARACTOR	BBY51-E6327	SIEMENS
2	C1, C3, C5, C7, C9, C10	100pF	CAPACITOR, CERAMIC, 100pF, 10%, COG, 0603	GRM39CCG101K050	MURATA
3	C29, C2	0.1uF	CAPACITOR, CERAMIC, .1uF, 10%, X7R, 0603	GRM39X7R104K016AD	MURATA
4	C4, C8, C17	.01uF	CAPACITOR, CERAMIC, .01uF, 10%, X7R, 0603	GRM39X7R103K050	MURATA
5	C6	220pF	CAPACITOR, CERAMIC, 220pF, 5%, COG, 0603	GRM39CCG221J025	MURATA
6	C11	3.3pF	CAPACITOR, CERAMIC, 3.3pF, 5%, COG, 0603	GRM39CCG3R3B100V	MURATA
7	C12	6.8pF	CAPACITOR, CERAMIC, 6.8pF, +/- .25pF, COG, 0603	GRM39CCG6R8C100V	MURATA
8	C13, C35, C36, C37	1000pF	CAPACITOR, CERAMIC, 1000pF, 10%, X7R, 0603	GRM39X7R102K016	MURATA
9	C14	1500pF	CAPACITOR, CERAMIC, 1500pF, 10%, X7R, 0603	GRM39X7R152K016	MURATA
10	C15	12pF	CAPACITOR, CERAMIC, 12pF, 5%, COG, 0603	GRM39CCG120J050	MURATA
11	C16	4700pF	CAPACITOR, CERAMIC, 4700pF, 10%, 0603	GRM39X7R472K016	MURATA
12	C20, C18	22pF	CAPACITOR, CERAMIC, 22pF, 10%, COG, 0603	GRM36CCG220K050	MURATA
13	C22, C32, C33, C34	DNP	CAPACITOR, CERAMIC, ., ., ., 0603		MURATA
14	C23, C24, C27	4.7uF	CAPACITOR, TANTALUM, 4.7uF, 10%, 3216	T491A475K006AS	KEMET
15	R16, C31, R17	0 OHM	RESISTOR, ZERO OHM, 0603	ERJ3G5Y0R00	PANASONIC
16	JP1	FTSH-110-02-F-D	HEADER, DUAL ROW 10X2, .050X.050	FTSH-110-02-F-D	SAMTEC
17	JP2	FTSH-105-02-F-D	HEADER, DUAL ROW 5X2, .050X.050	FTSH-105-02-F-D	SAMTEC
18	JP3	TSW-104-08-T-S	HEADER, SINGLE ROW 4 PIN, .100"	TSW-104-08-T-S	BERG
19	J5, J6	82MCMX	RF CONNECTOR	82MCMX-50-0-1	SUJNER
20	L1	18nH	INDUCTOR, 18nH, 10%, 0805	0805CS-180XJBC	COTLCRAFT
21	L3	0 OHM	ZERO OHM JUMPER	RM73Z1JT	KOA
22	L4, L6, L9, L10, L11, L12	BLM11A121S	FERRITE BEAD, 0603	BLM11A121S	MURATA
23	L14	82nH	INDUCTOR, 82nH, 10%, 0805	LL2012-F82NK	TOKO
24	Q1	BFR520	TRANSISTOR, NPN	BFR520	PHILIPS
25	R1, R2, R3, R11, R30	1K	RESISTOR, 1K, 5%, 0603	ERF3GSYJ102	PANASONIC
26	R4	10	RESISTOR, 10 OHM, 5%, 0603	ERJ3GSYJ1R0	PANASONIC

FIG. 56A

27	1	R8	2K	RESISTOR, 2K, 5%, 0603	ERJ3GSYJ202	PANASONIC
28	1	R9	75	RESISTOR, 75 OHM, 5%, 0603	ERJ3GSYJ750	PANASONIC
29	1	R10	3300	RESISTOR, 3.3K, 5%, 0603	ERJ3GSYJ332	PANASONIC
30	1	R12	13K	RESISTOR, 13K, 5%, 0603	ERJ3GSYJ133	PANASONIC
31	1	R13	1.5K	RESISTOR, 1.5K, 5%, 0603	ERJ3GSYJ152	PANASONIC
32	1	R14	220	RESISTOR, 220 OHM, 5%, 0603	ERJ3GSYJ221	PANASONIC
33	1	R15	DNP	RESISTOR, ZERO OHM, 0603	ERJ3GSYOR00	PANASONIC
34	2	R18, R19	DNP	RESISTOR, 91 OHM, 5%, 0603	ERJ3GSYJ910	PANASONIC
35	1	R36	TBD	RESISTOR, ZERO OHM, 0603	ERJ3GSYOR00	PANASONIC
36	1	R37	DNP	RESISTOR, , , , 0603		PANASONIC
37	1	TP1	TEST POINT			
38	1	U1	PE3282A	IC, SYNTHESIZER	PE3282A	PEREGRINE
39	1	U2	CXO-3M-10N-40MHz	XTAL OSC, 40MHz	CXO-3M-10N-40MHZ A/1	STATEK
40	1	U4	TK11233AMTL	VOLTAGE REGULATOR, 3.5V	TK11233BM	TOKO
41	1	U5	74125	IC, BUFFER	MC74LCX125DT	MOTOROLA
42	1	U6	UPC1678GV	IC, RF AMPLIFIER	UPC1678GV	NEC
43	1		STB500.641.008 V03.00	BOARD		

FIG. 56B

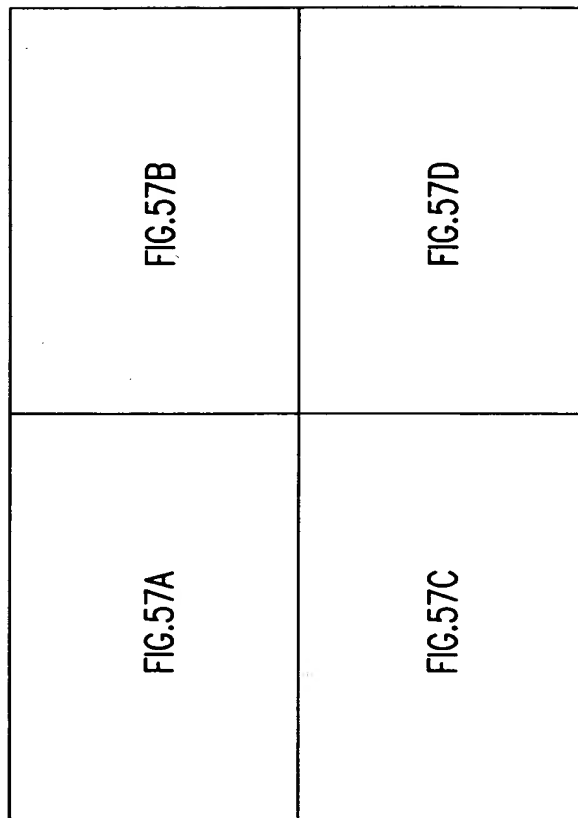
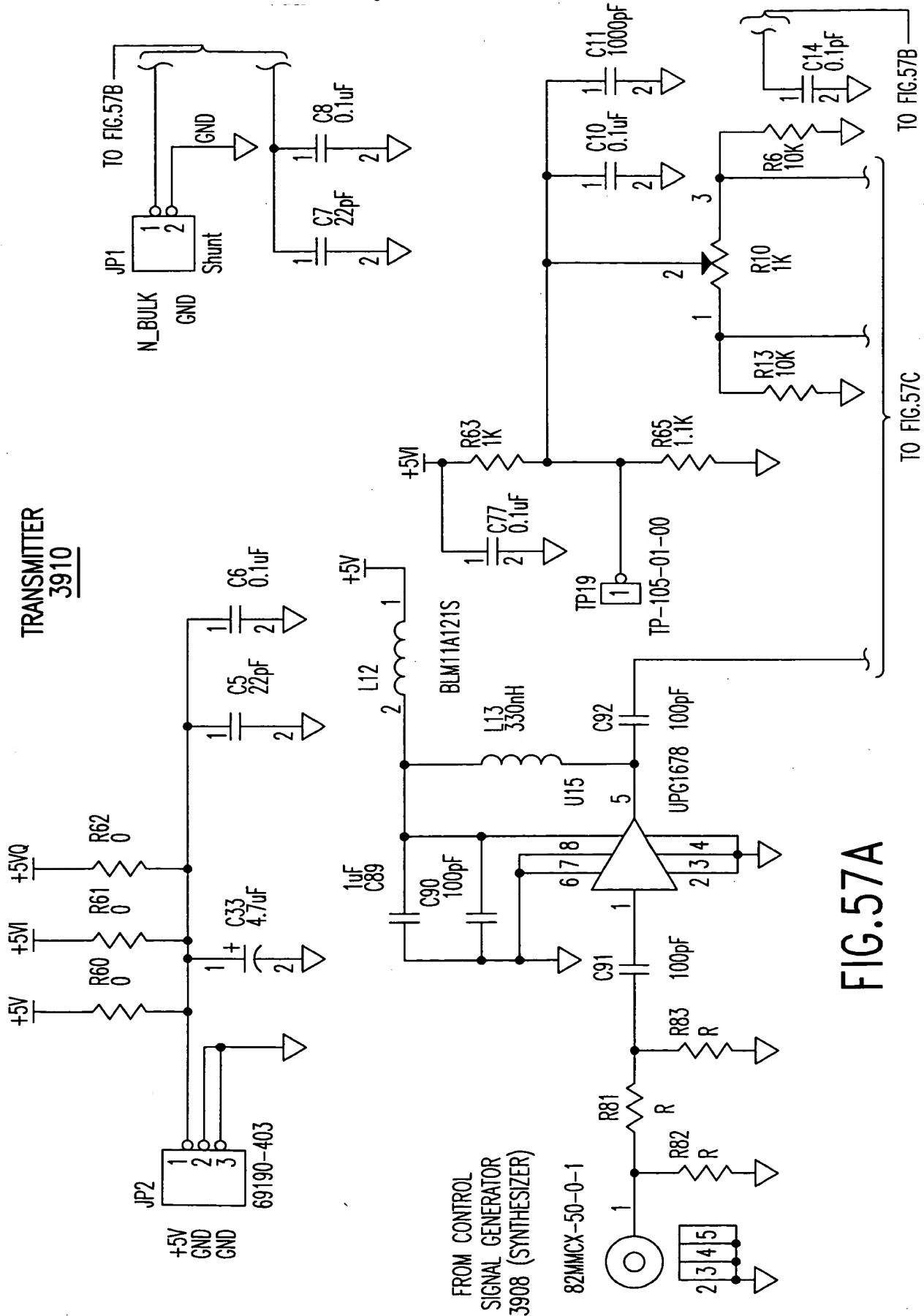


FIG.57





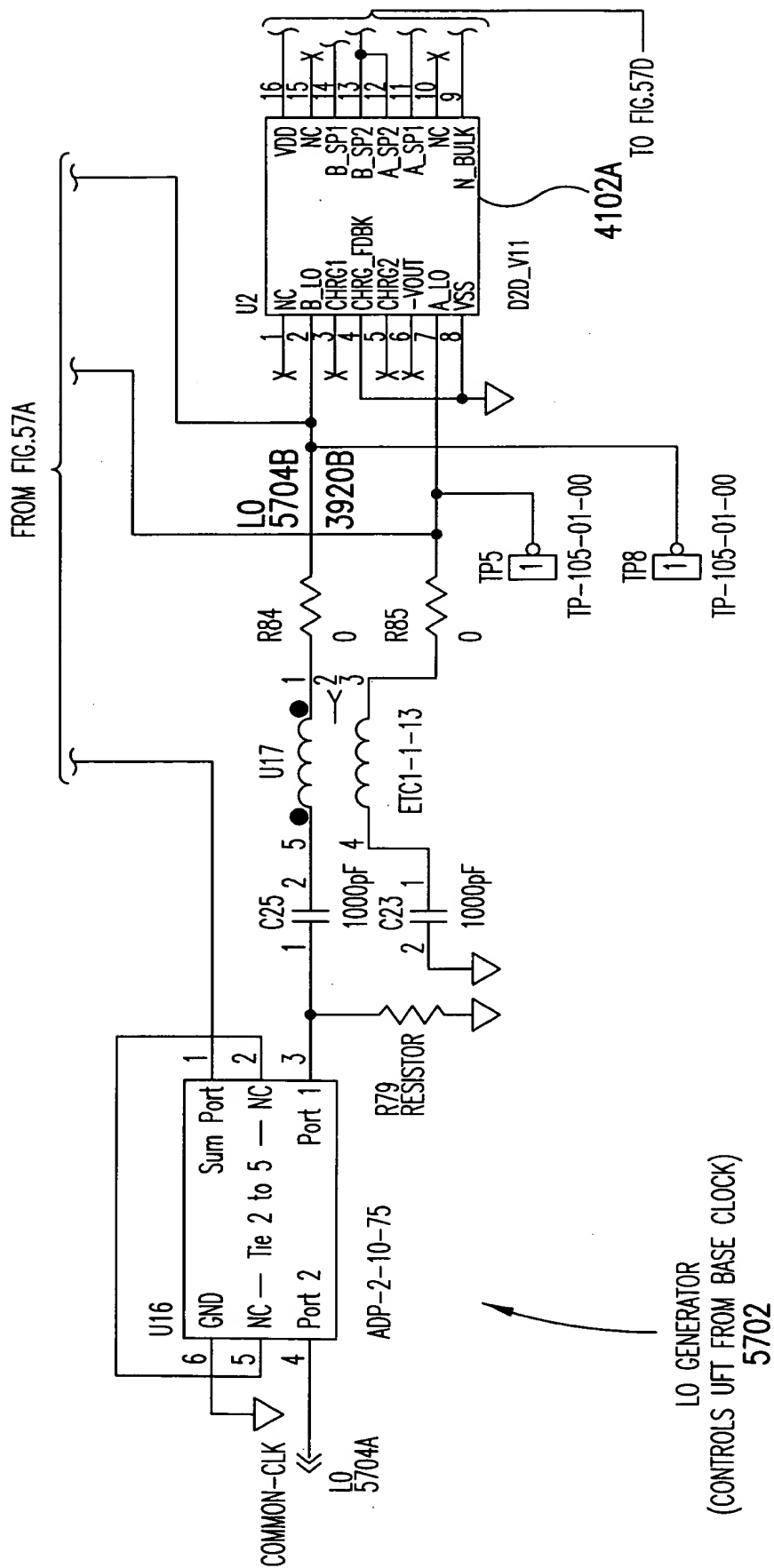
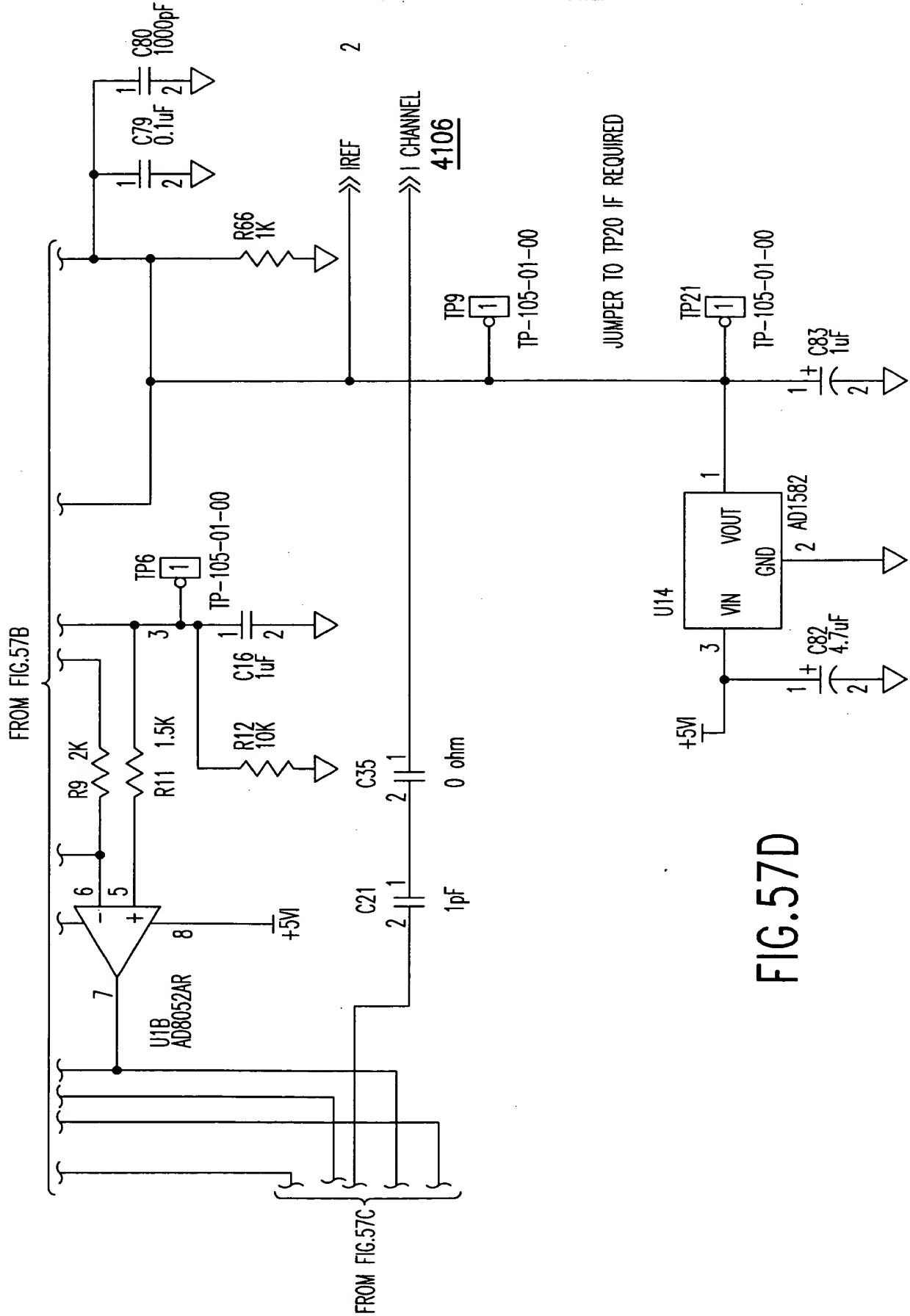
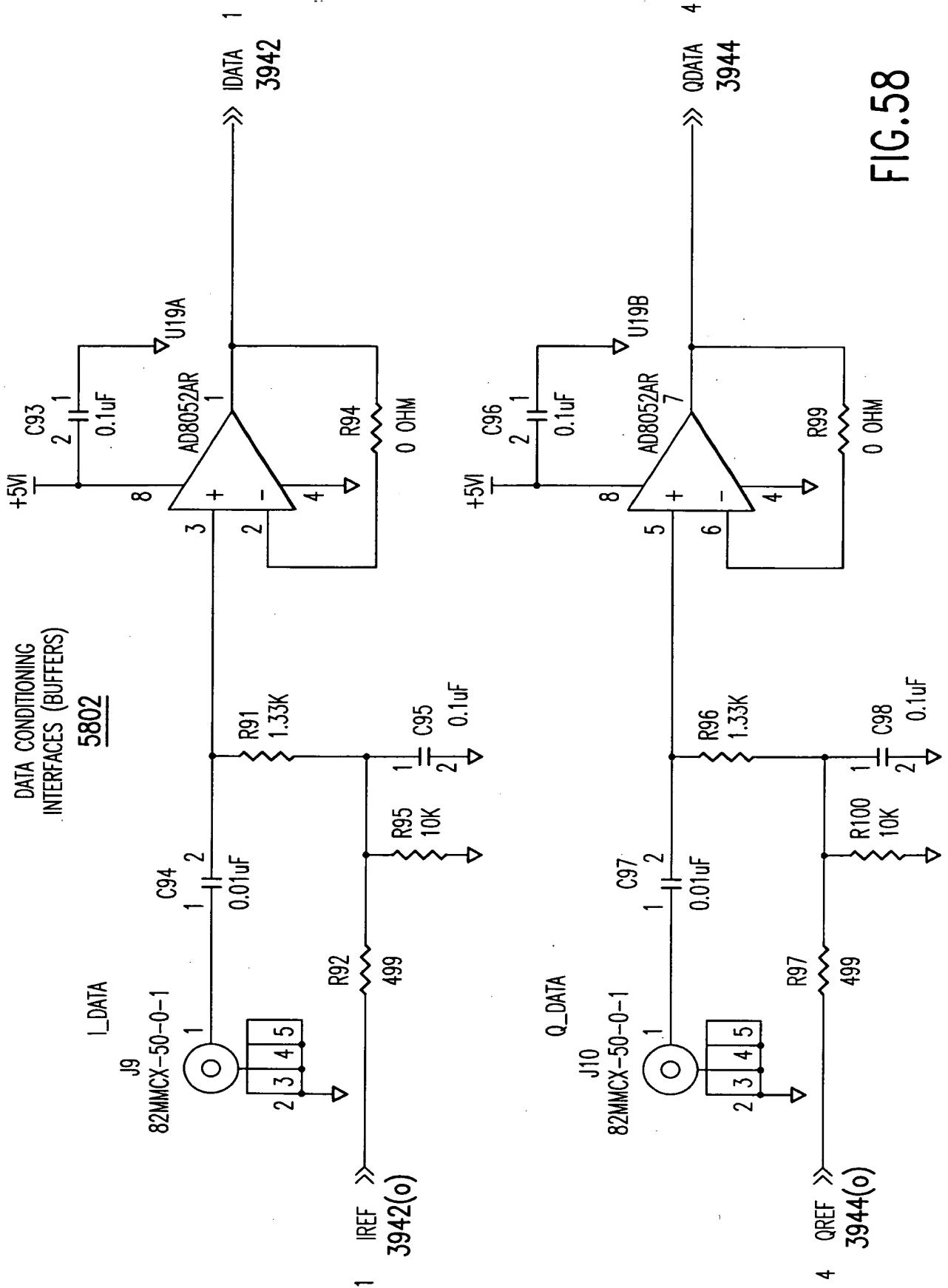


FIG.57C





**FIG.58**



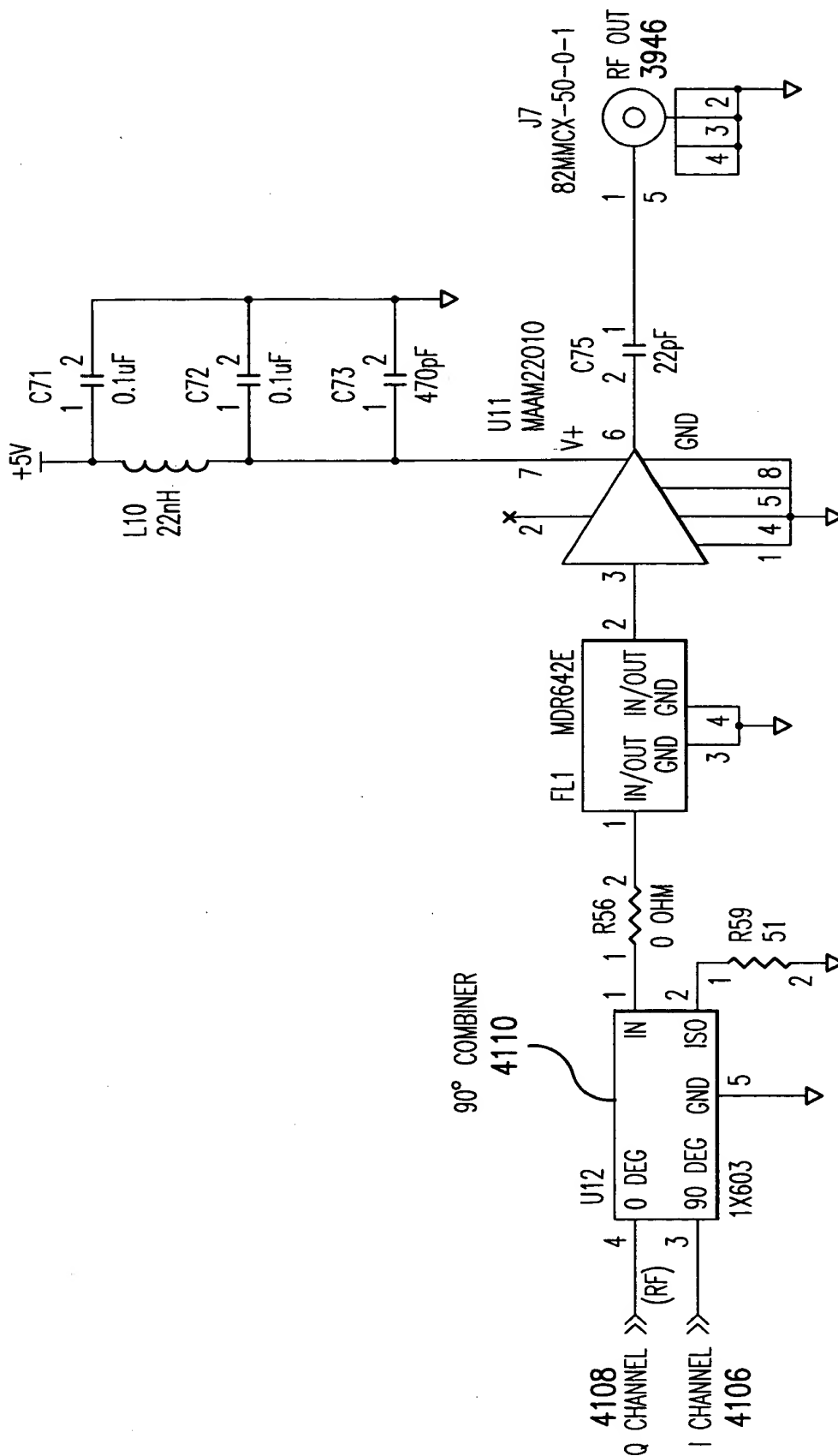


FIG.59

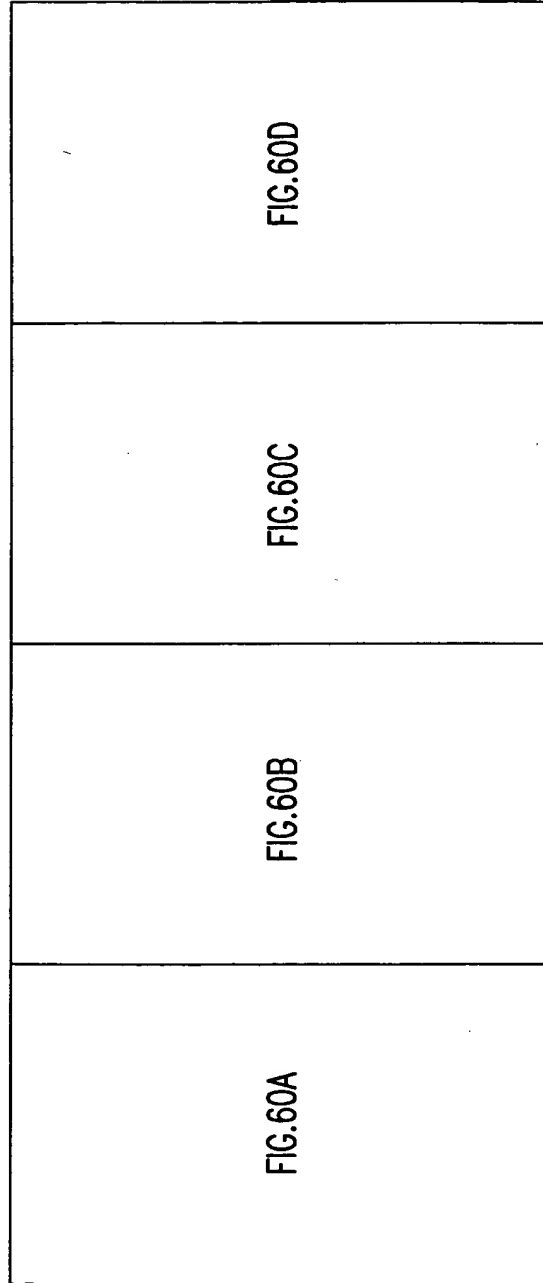


FIG. 60

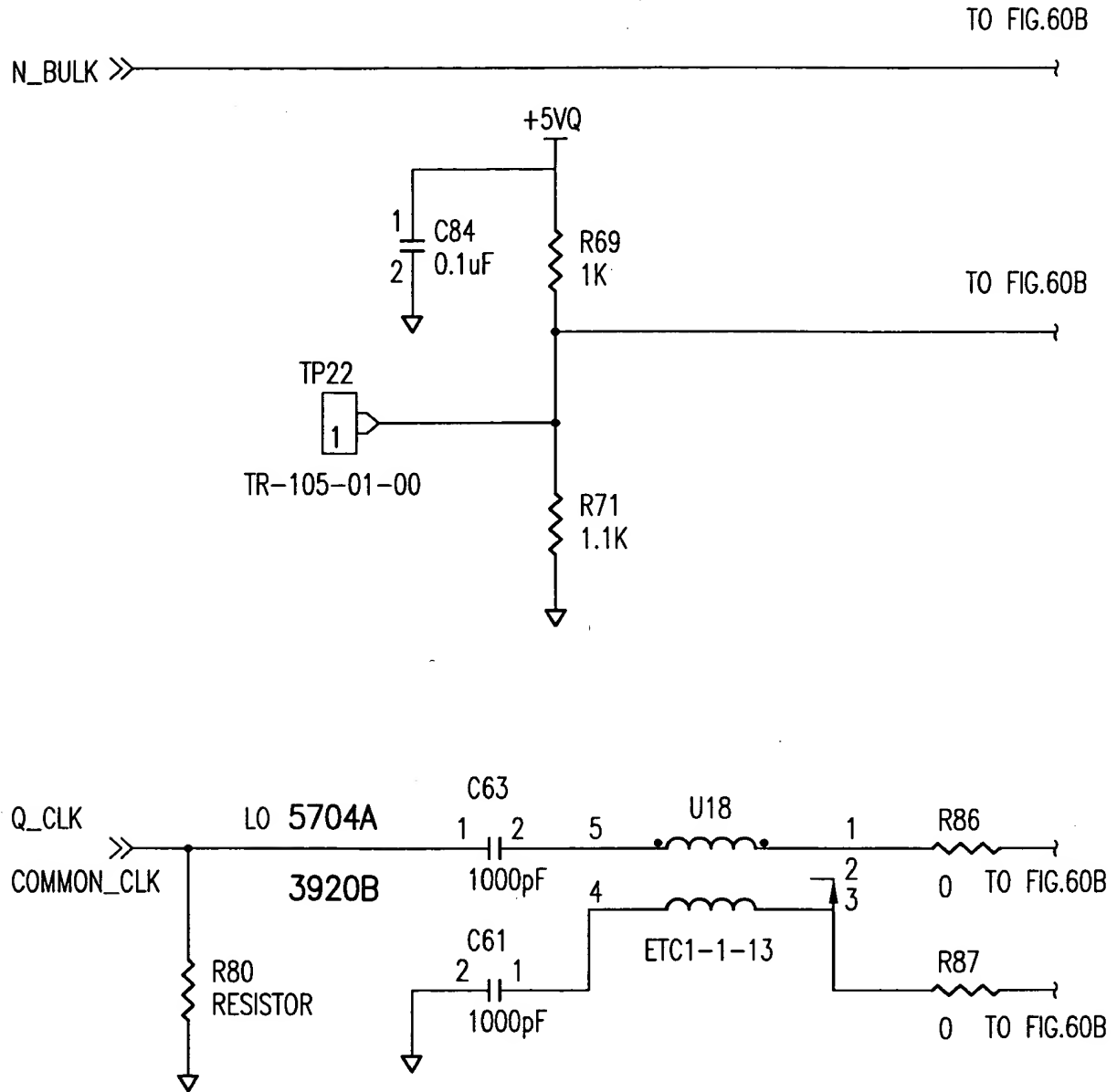


FIG.60A

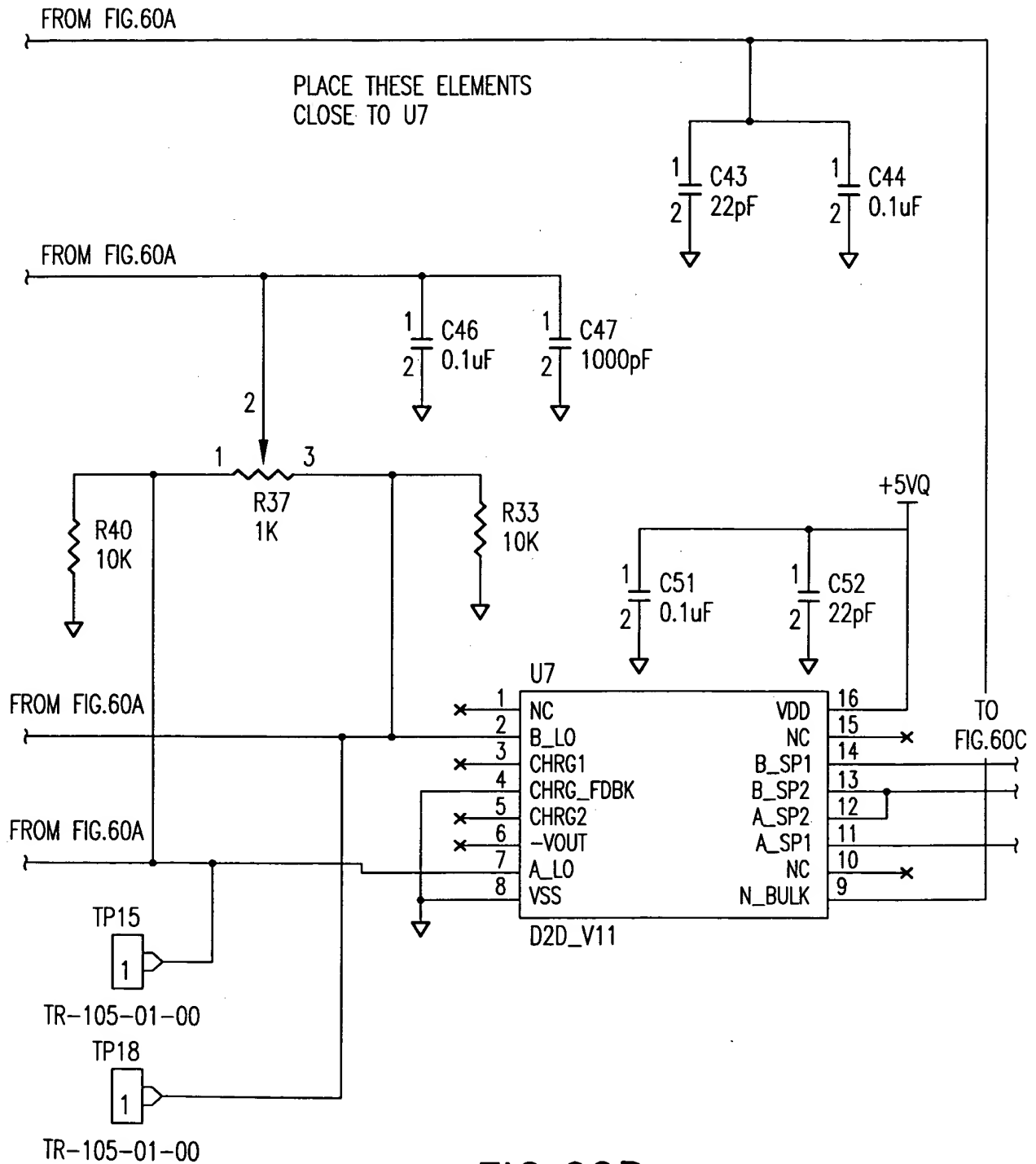


FIG.60B

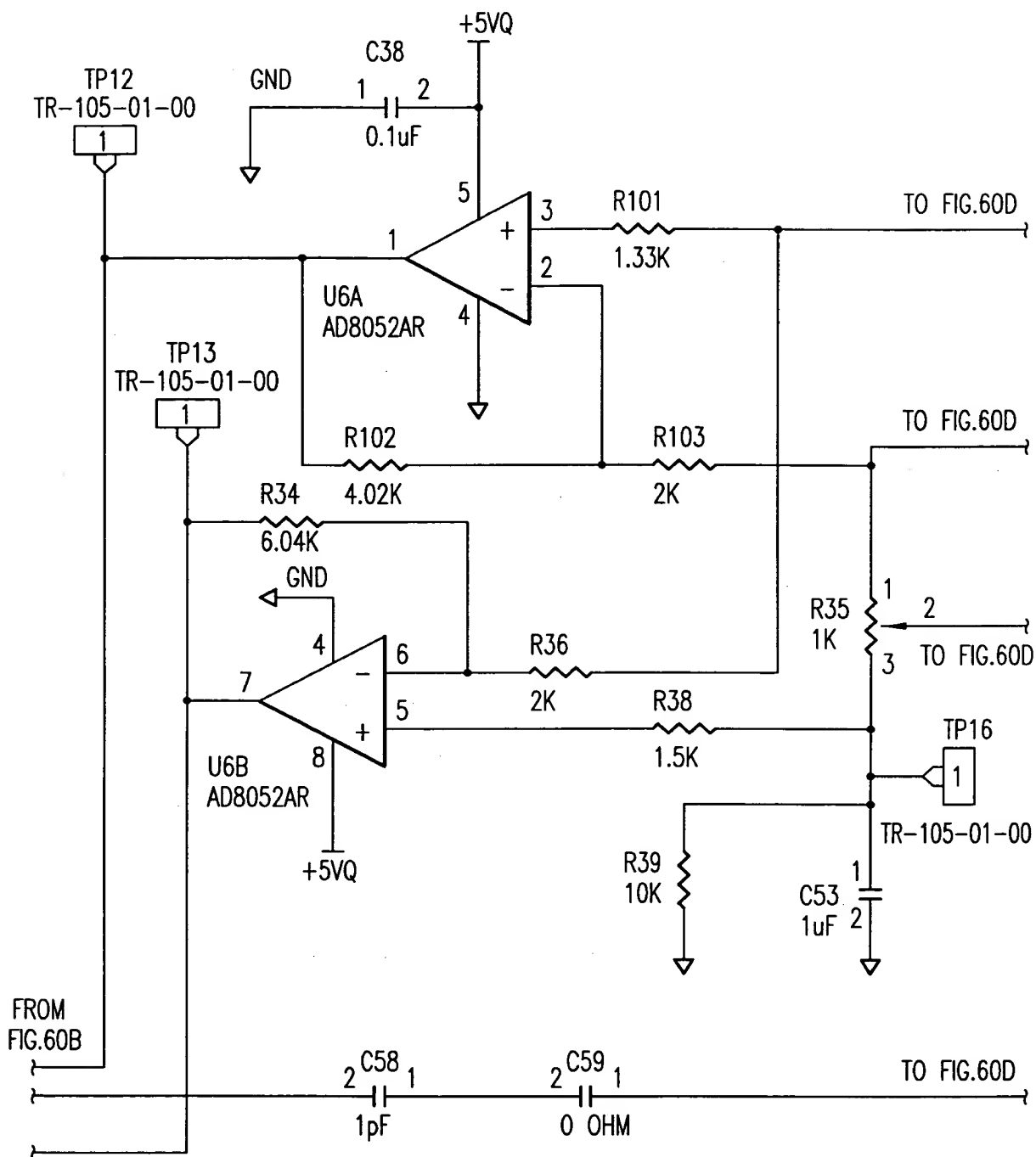


FIG. 60C

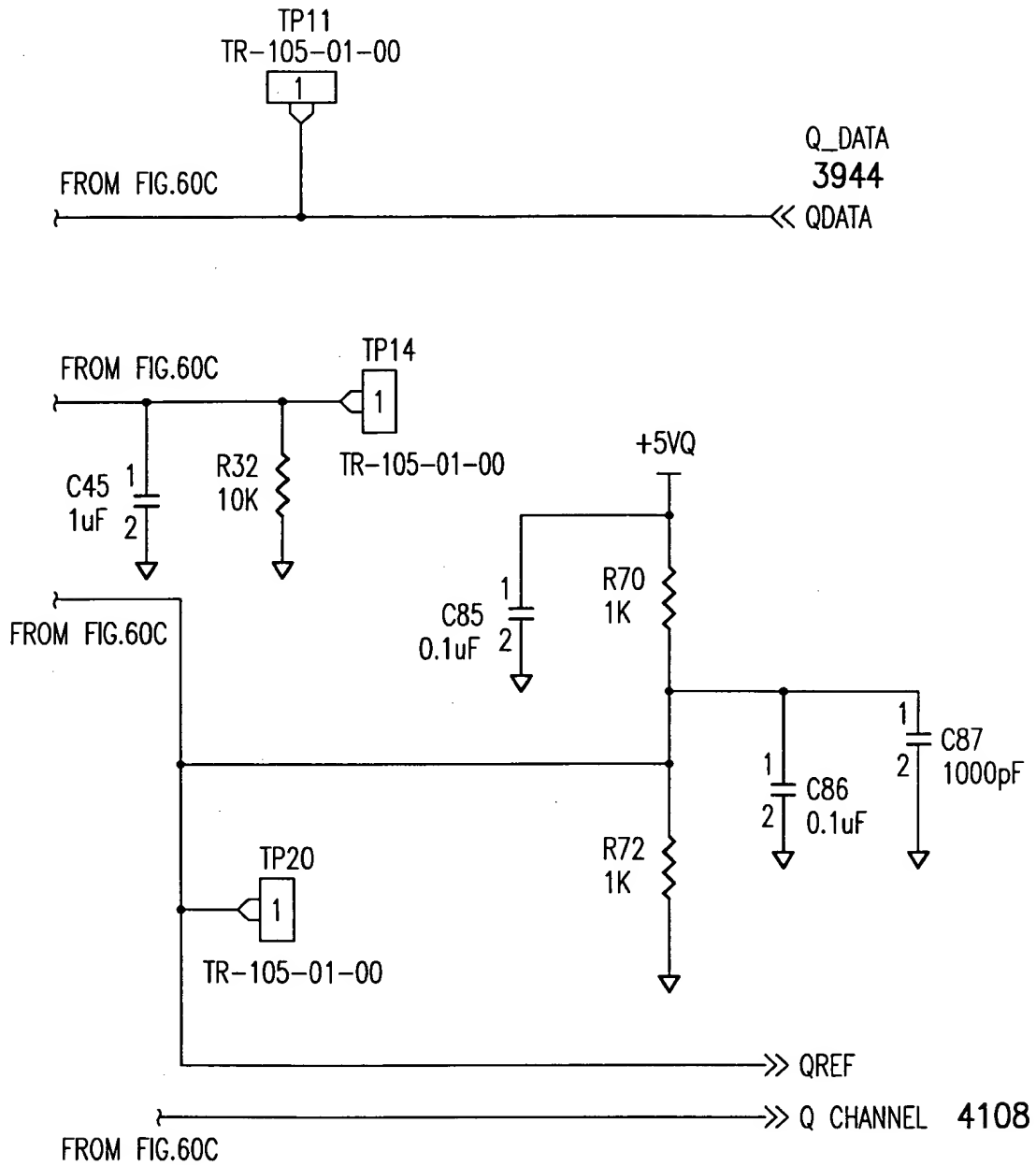


FIG. 60D

ITEM	QTY	REFERENCE	PART	PART NUMBER	MANUFACTURER
1	21	C3, C6, C8, C10, C14, C38, C44, C46, C51, C71, C72, C77, C78, C79, C84, C85, C86, C93, C95, C96, C98	0.1uF	GRM39X7R104K016	MURATA
2	6	C5, C7, C15, C43, C52, C75	22pF	GRM39C0G220J050	MURATA
3	5	C9, C16, C45, C53, C89	1uF	GRM40Y5V105Z016	MURATA
4	8	C11, C23, C25, C47, C61, C63, C80, C87	1000pF	GRM39X7R102K050	MURATA
5	2	C58, C21	1pF	GRM39C0G010B50V	MURATA
6	2	C82, C33	4.7uF	T491A475K006AS	KEMET
7	2	C59, C35	0 ohm	GRM39C0Gxxx50V	MURATA
8	1	C73	470pF	GRM39C0G471J050	MURATA
9	1	C83	1uF	T491A105M016AS	KEMET
10	3	C90, C91, C92	100pF	ECU-V1H101JCV	
11	2	C94, C97	0.01uF	GRM39X7R103K016	MURATA
12	1	FL1	MDR642E	MDR642E	SOSHIN
13	1	JP1	Shunt	69190-402	BERG
14	1	JP2	69190-403	69190-403	BERG
15	4	J7, J8, J9, J10	82MCMX-50-0-1	82MCMX-50-0-1	SUJNER
16	1	L10	22nH	LL1608-F22NK	COILCRAFT
17	1	L12	BLM11A121S	BLM11A121S	MURATA
18	1	L13	330nH	LL2012-FR33K	
19	10	R5, R6, R12, R13, R32, R33, R39, R40, R95, R100	10K	ERJ3KF1002	PANASONIC
20	2	R34, R7	6.04K	ERJ3KF6041	PANASONIC
21	4	R8, R10, R35, R37	1K	3224W-1-102	BOURNS
22	4	R9, R36, R90, R103	2K	ERJ3KF2001	PANASONIC
23	2	R38, R11	1.5K	ERJ3KF1501	PANASONIC
24	3	R56, R94, R99	0 ohm	ERJ3G5Y0R00	PANASONIC

FIG. 61A

25	1	R59	51	ERJ3G5YJ510	PANASONIC
26	7	R60, R61, R62, R84, R85, R86, R87	0	ERJ3G5Y0R00	PANASONIC
27	6	R63, R64, R66, R69, R70, R72	1K	ERJ3EKF1001	PANASONIC
28	2	R71, R65	1.1K	ERJ3EKF1101	PANASONIC
29	2	R80, R79	RESISTOR		
30	3	R81, R82, R83	R		
31	4	R88, R91, R96, R101	1.33K	ERJ3EKF1331	PANASONIC
32	2	R102, R89	4.02K	ERJ3EKF4021	PANASONIC
33	2	R92, R97	499	ERJ3EKF4990	PANASONIC
34	19	TP1, TP2, TP3, TP4, TP5, TP6, TP8, TP9, TP11, TP12, TP13, TP14, TP15, TP16, TP18, TP19, TP20, TP21, TP22	TP-105-01-00		
35	3	U1, U6, U19	AD8052AR	AD8052AR	ANALOG DEVICES
36	2	U7, U2	D2D_V11	D2D_V11	PARKER VISION
37	1	U11	MAAM22010	MAAM22010	MACOM
38	1	U12	1X603	1X603	ANAREN
39	1	U14	AD1582	AD1582	ANALOG DEVICES
40	1	U15	UPG1678	UPG1678GV	NEC
41	1	U16	ADP-2-10-75	ADP-2-10-75	MINI-CIRCUITS
42	1		BOARD	8500.641.021	V05.10

FIG.61B



FIG.62A	FIG.62B
FIG.62C	FIG.62D
FIG.62E	FIG.62F
FIG.62G	FIG.62H
FIG.62I	

FIG. 62

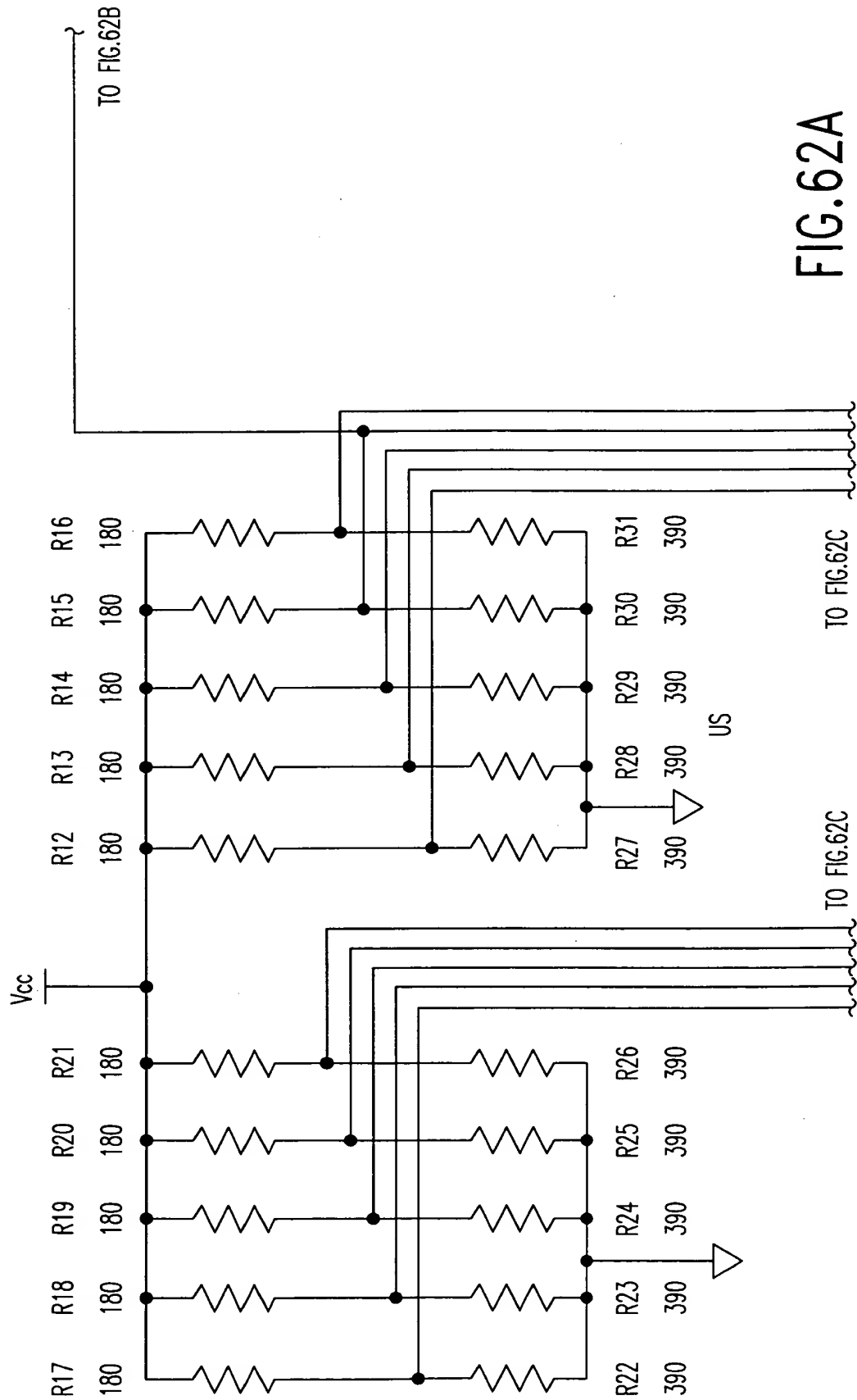
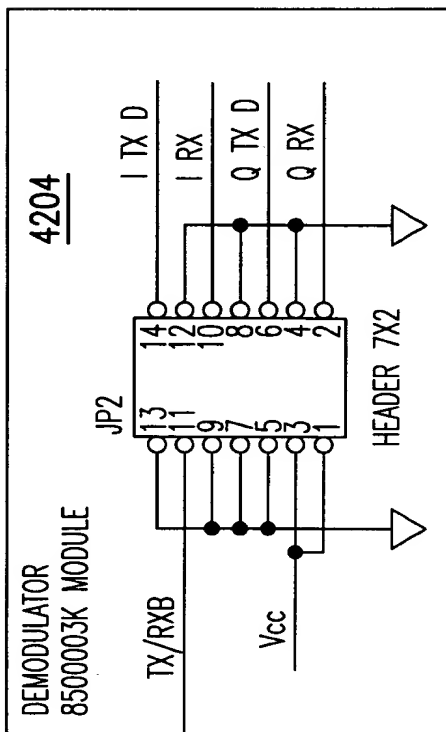
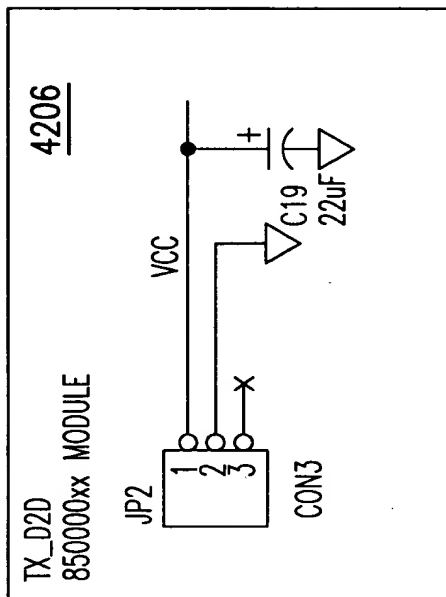


FIG. 62A



FROM FIG. 62A

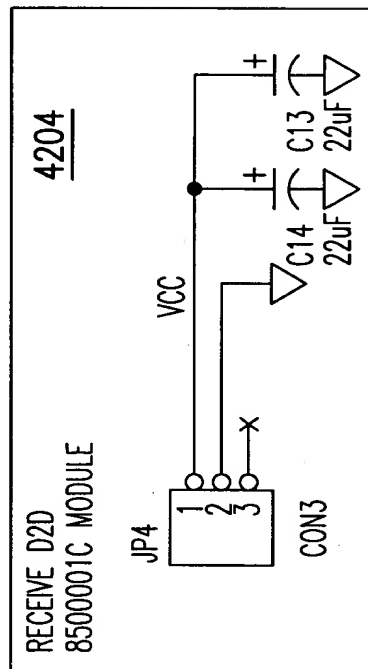


FIG. 62B

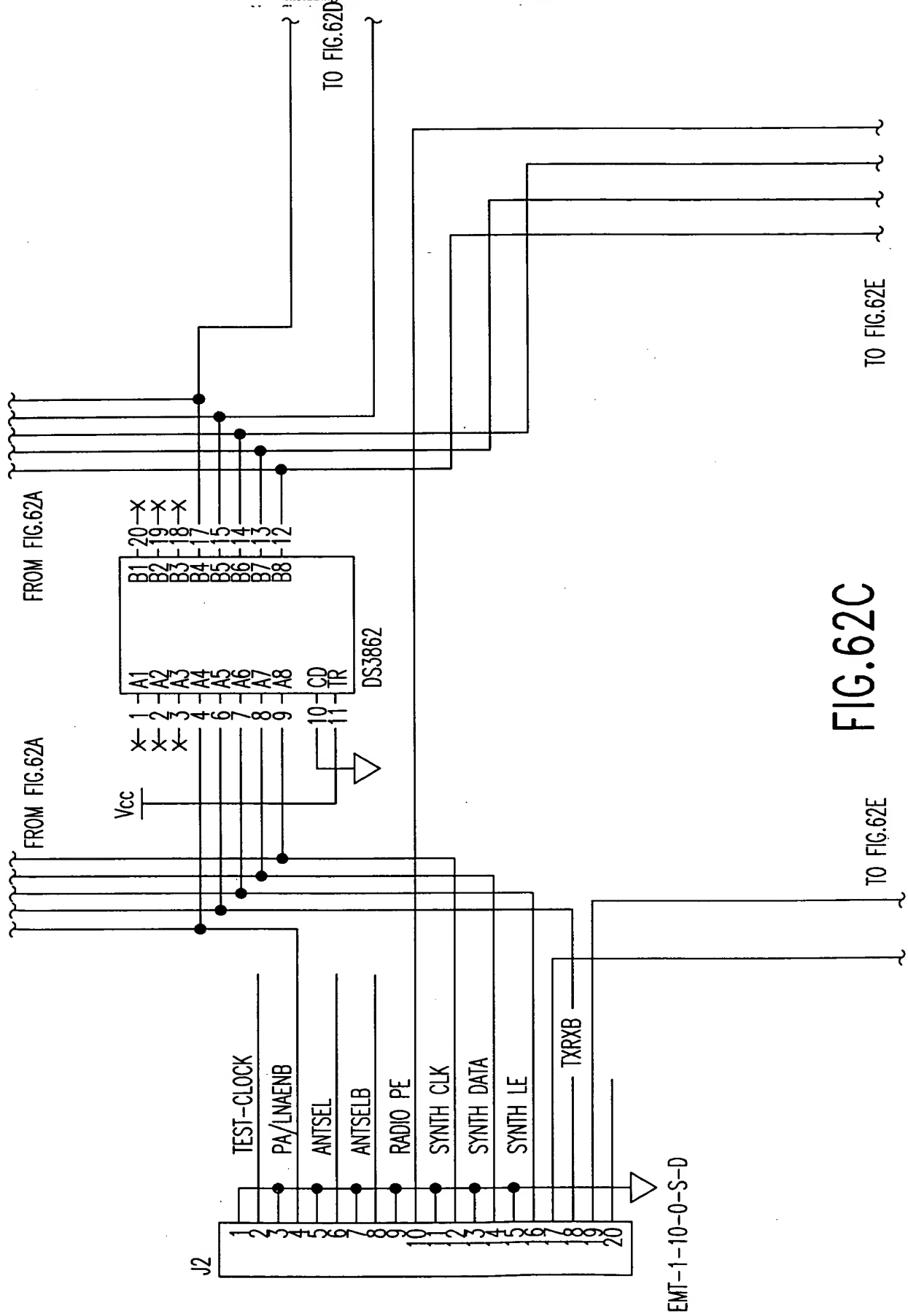


FIG. 62C

LNA/PA  
 8500002C MODULE  
4212

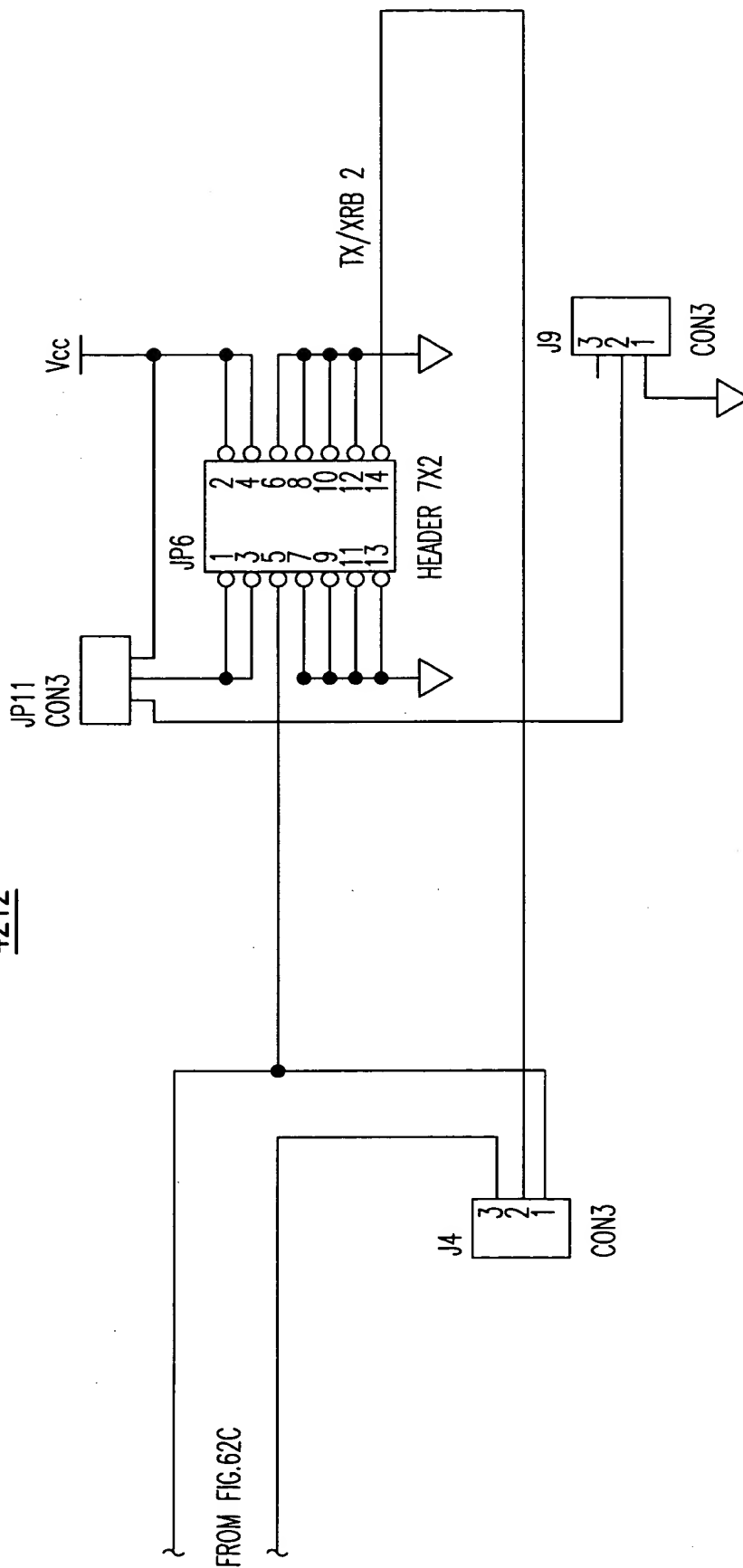


FIG. 62D

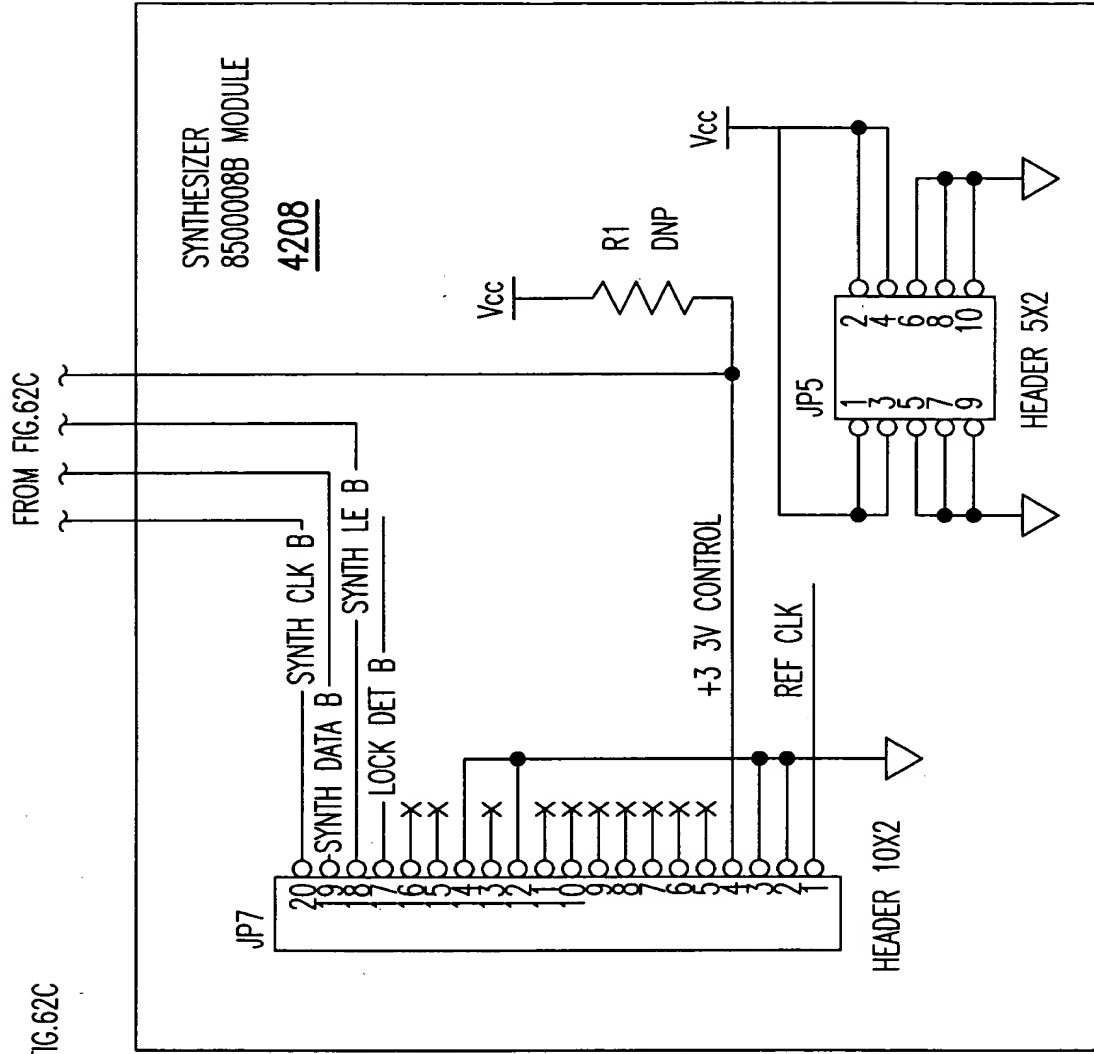


FIG. 62E



TO FIG. 62H

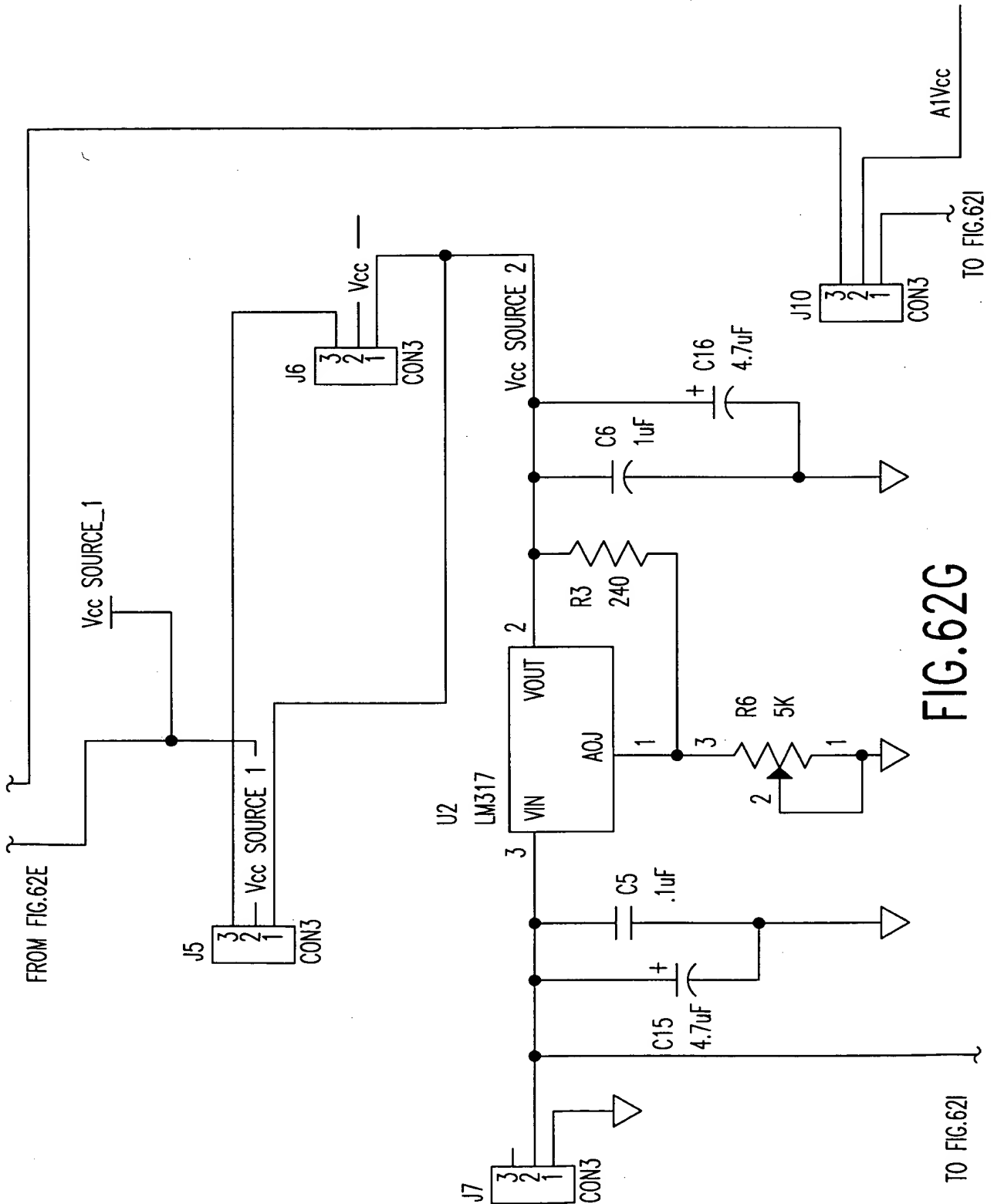


FIG.62G



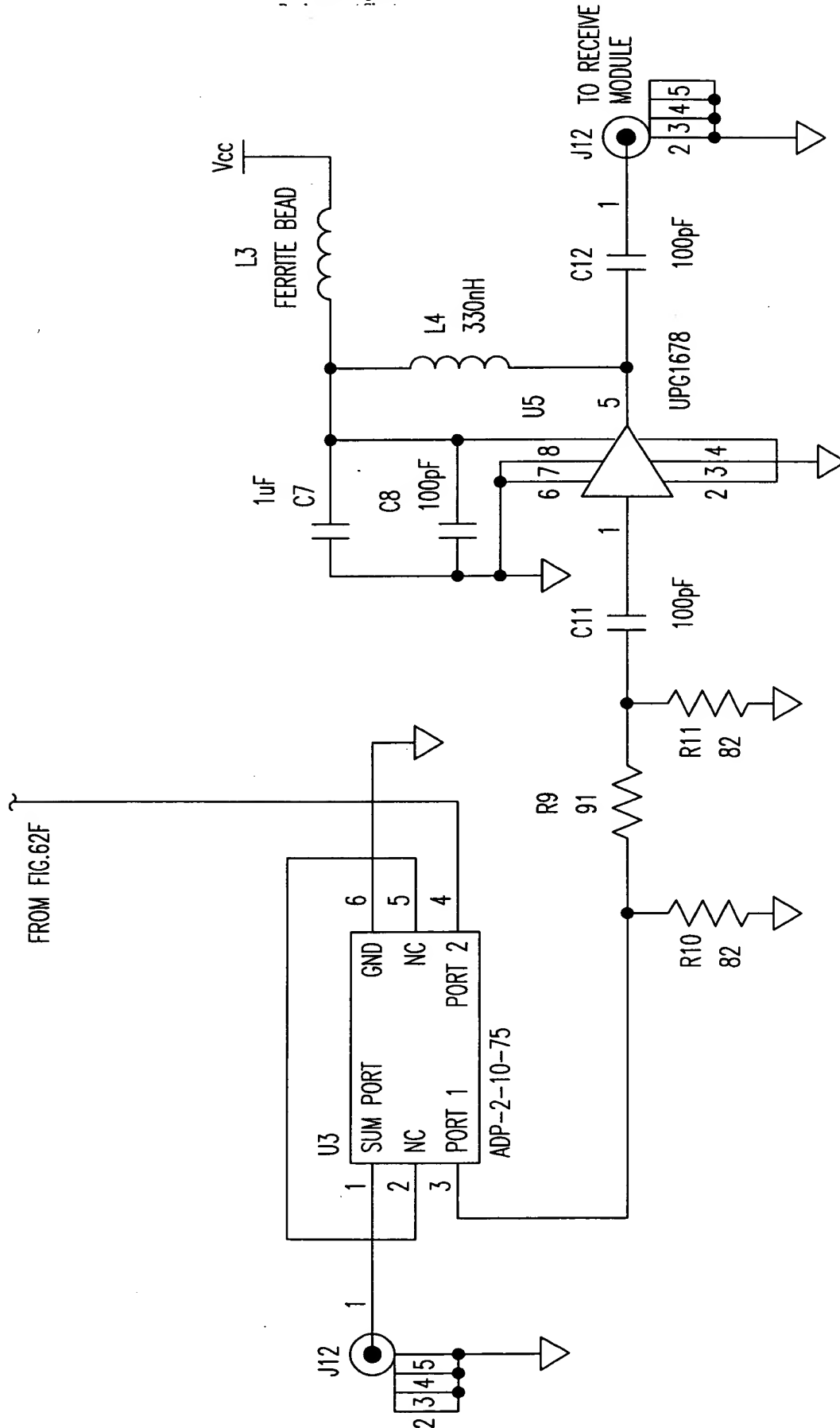


FIG. 62H

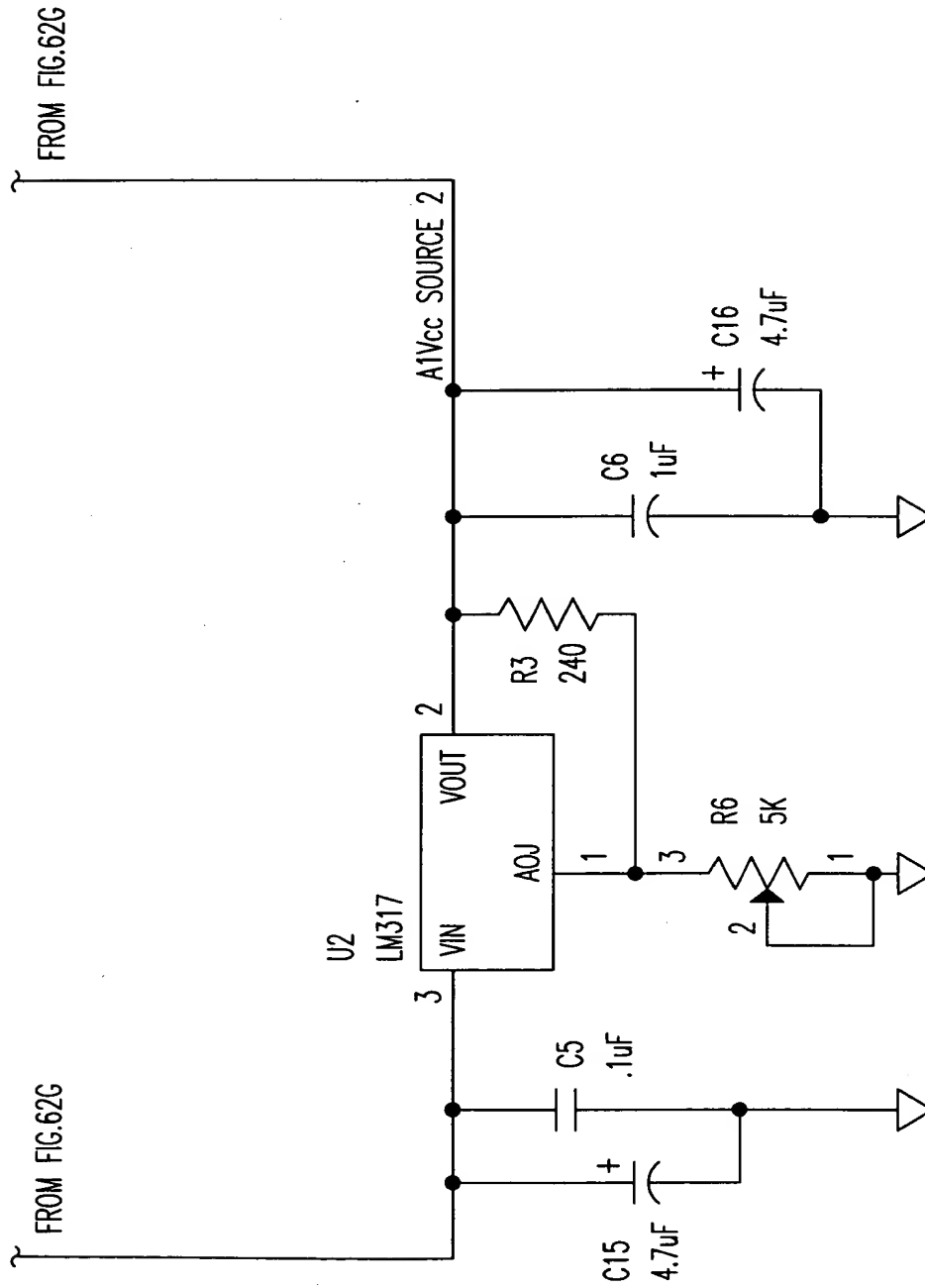


FIG. 62I

ITEM	QTY	REFERENCE	PART	DESCRIPTION	PART NUMBER	VENDOR
1	4	C1,C6,C7,C10	1uF	Cap, 1uF, +80-20%, 0805	GRM40Y5V105Z016AD	MURATA
2	6	C2,C3,C4,C8,C11,C12	100pF	Cap, 100pF, 5%, COG, 0603	ECU-V1H101JCV	PANASONIC
3	2	C5,C9	.1uF	Cap, .1uF, +80-20%, Y5V, 0603		MURATA
4	3	C13,C14,C19	22uF	Cap, Tant, 22uF, 20%, 20V	T491D226M020AS	KEMET
5	4	C15,C16,C17,C18	4.7uF	Cap, Tant, 4.7uF, 20%, 20V	T491C475M020AS	KEMET
6	2	JP2,JP6	HEADER 7X2	Receptacle, 7x2pin, .050	SFMC-107-L1-S-D	SAMTEK
7	9	JP4, J4, J5, J6, J7, JP9, J9, J10, JP11	CON3	Header, 3pin, .100"	69190-403	BERG
8	1	JP7	HEADER 10X2	Receptacle, 10X2pin, .050	SFMC-110-L1-S-D	SAMTEK
9	1	JP8	HEADER 5X2	Receptacle, 5X2pin, .050	SFMC-105-L1-S-D	SAMTEK
10	1	J2	EHT-1-10-01-S-D	Header, ribbon, 10X2pin, 2mm	EHT-1-10-01-S-D	SAMTEK
11	3	J8,J11,J12	82MMCX-50-0-1	Connector, RF	82MMCX-50-0-1	SUHRER
12	2	L3,L1	Ferrite Bead	Ferrite Bead, 0805	BLM21A121S	MURATA
13	2	L4,L2	330mH	Ind, 330mH, 10%, 0805	LL2012-FR33K	TOKO
14	1	R1	DNP	Res, 0603		PANASONIC
15	2	R9,R2	91	Res, 91 Ohm, 5%, 0603	ERJ-3GSYJ910	PANASONIC
16	2	R7,R3	240	Res, 240 Ohm, 5%, 0603	ERJ-3GSYJ241	PANASONIC
17	4	R4,R5,R10,R11	82	Res, 82 Ohm, 5%, 0603	ERJ-3GSYJ820	PANASONIC
18	2	R8,R6	5K	Var Res, 5K, 10%	3296W001502	BOURNS
19	10	R12, R13, R14, R15, R16, R17, R18, R19, R20, R21	180	Res, 180 Ohm, 5%, 0603	ERJ-3GSYJ181	PANASONIC
20	10	R22, R23, R24, R25, R26, R27, R28, R29, R30, R31	390	Res, 390 Ohm, 5%, 0603	ERJ-3GSYJ391	PANASONIC
21	2	U5,U1	UPG1678	IC, RF Buffer	UPG1678GV	NEC
22	2	U4,U2	LM317	IC, Voltage Regulator	LM317T	NATIONAL
23	1	U3	ADP-2-10-75	RF Splitter	ADP-2-10-75	MINICIRCUITS
24	1	U6	DS3862	IC, Buffer	DS3862MM	NATIONAL
25	1			BOARD	ST8500.641.023VOL01	

FIG. 63

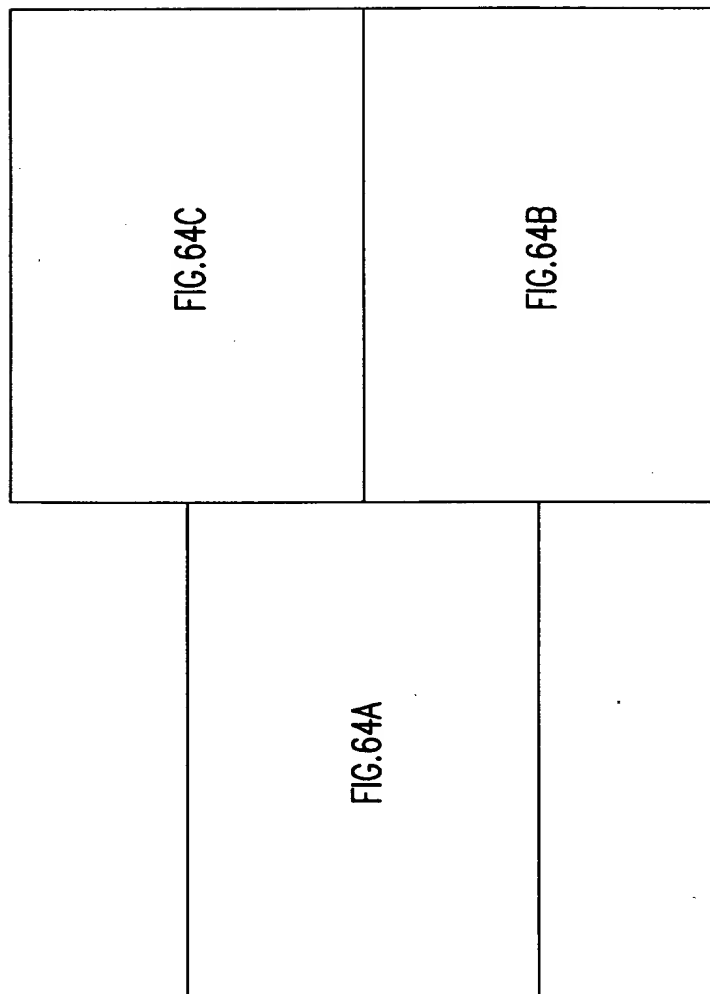


FIG. 64

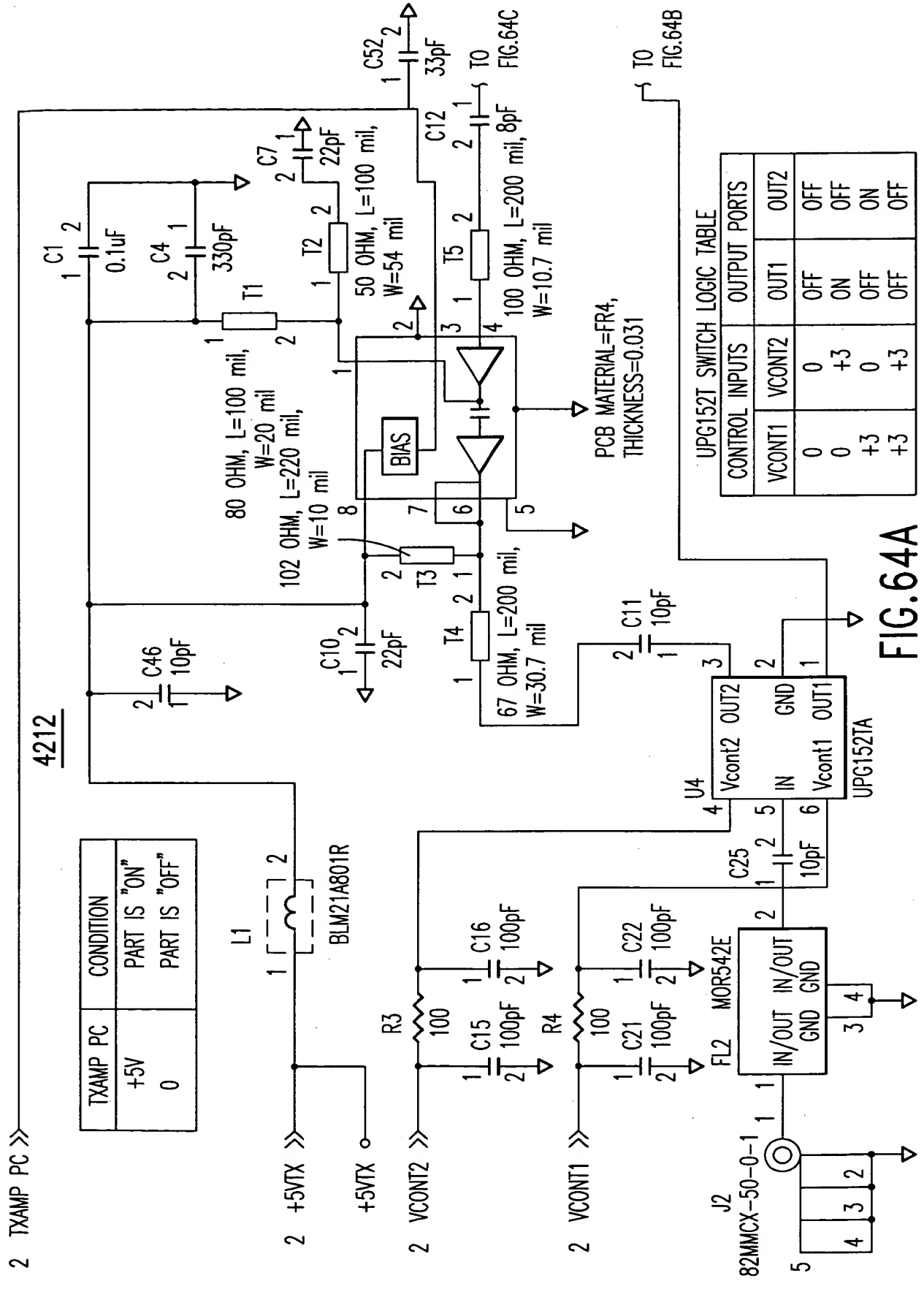


FIG. 64A

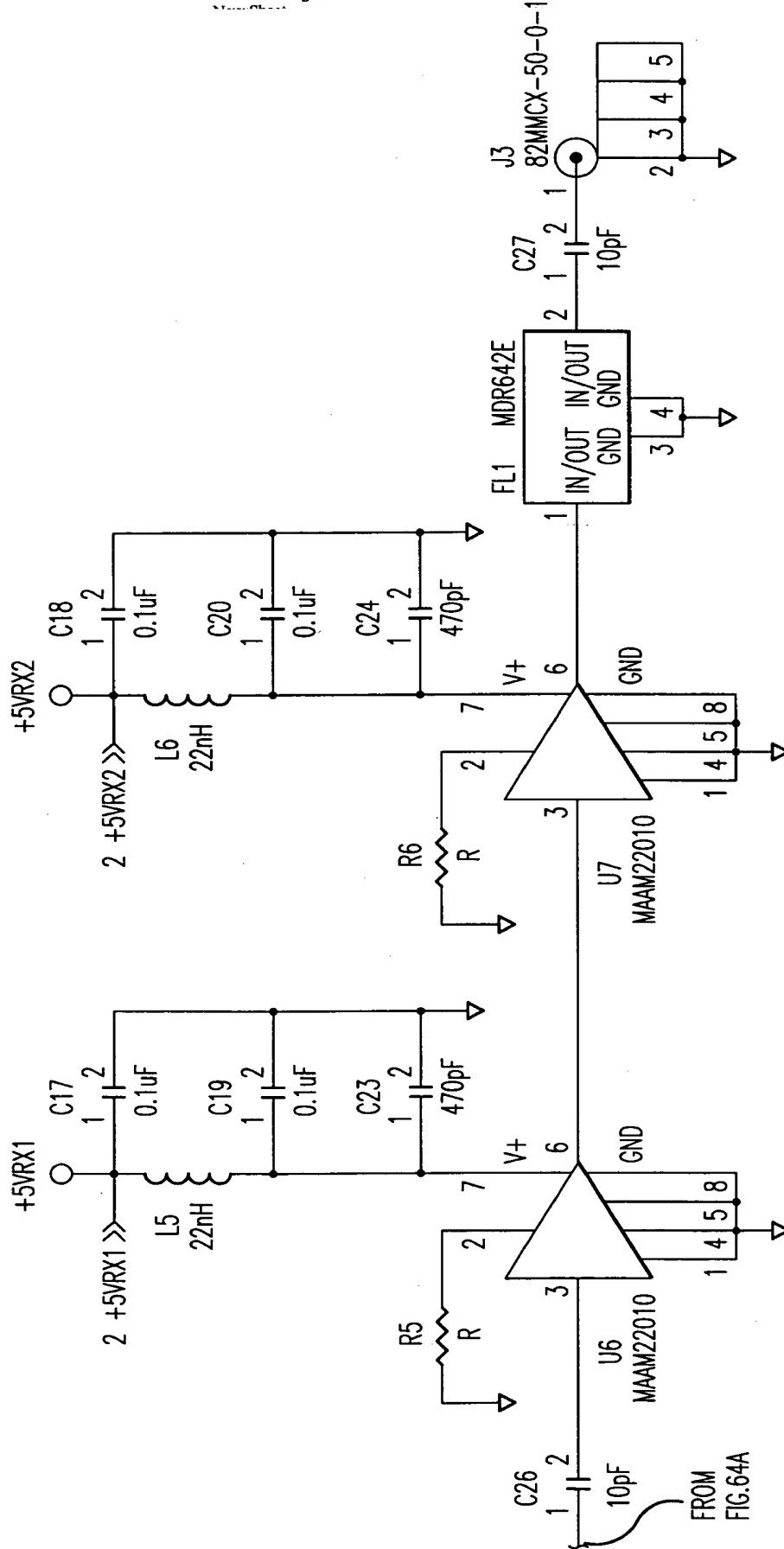


FIG. 64B



**FIG. 64C**

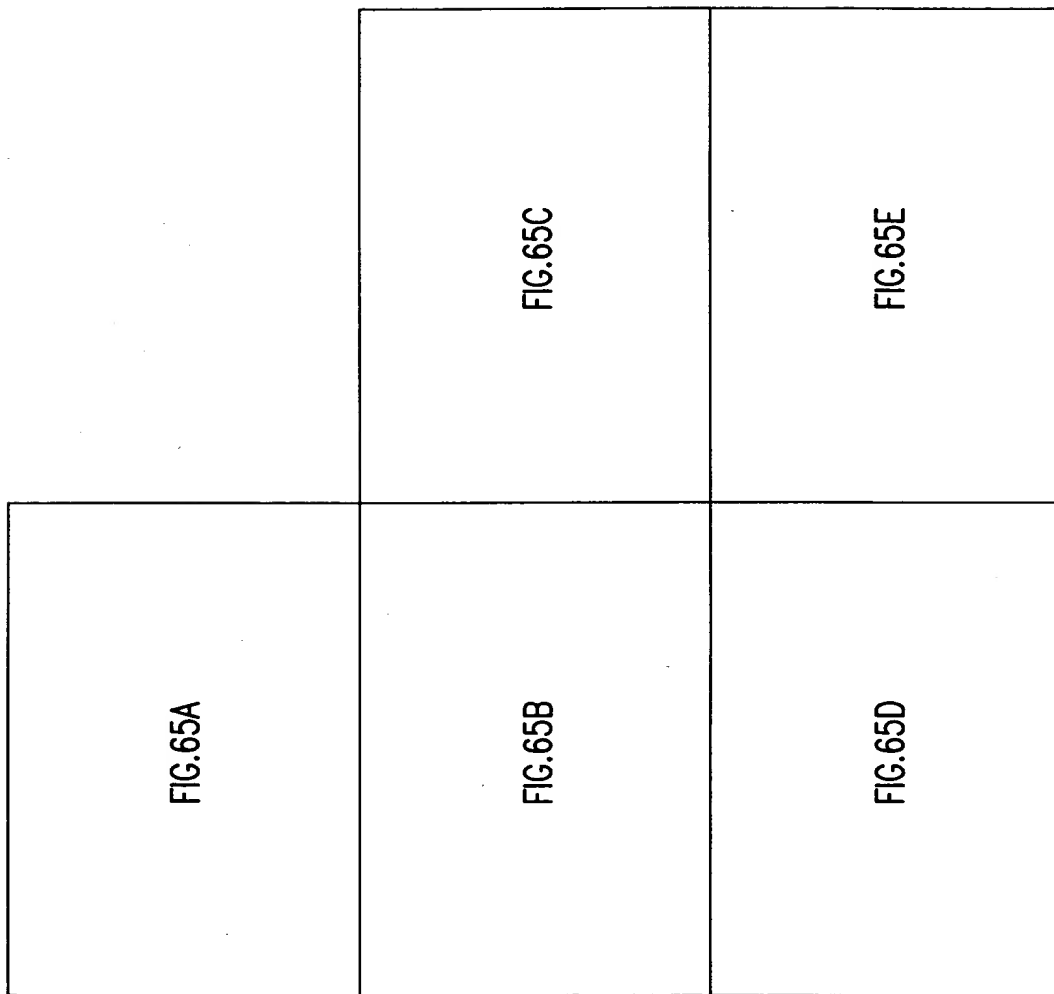


FIG. 65



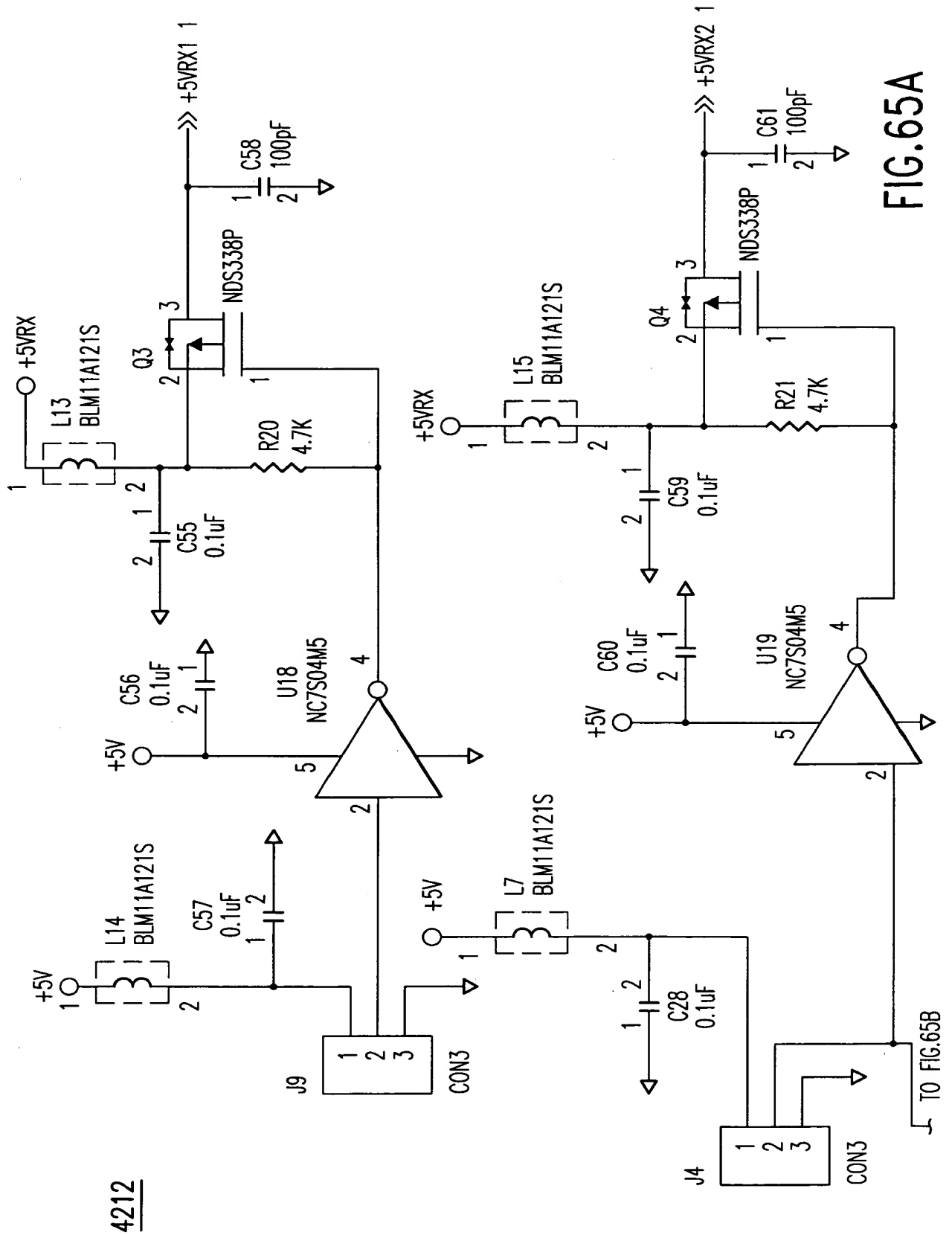


FIG. 65A

T0 FIG. 65B

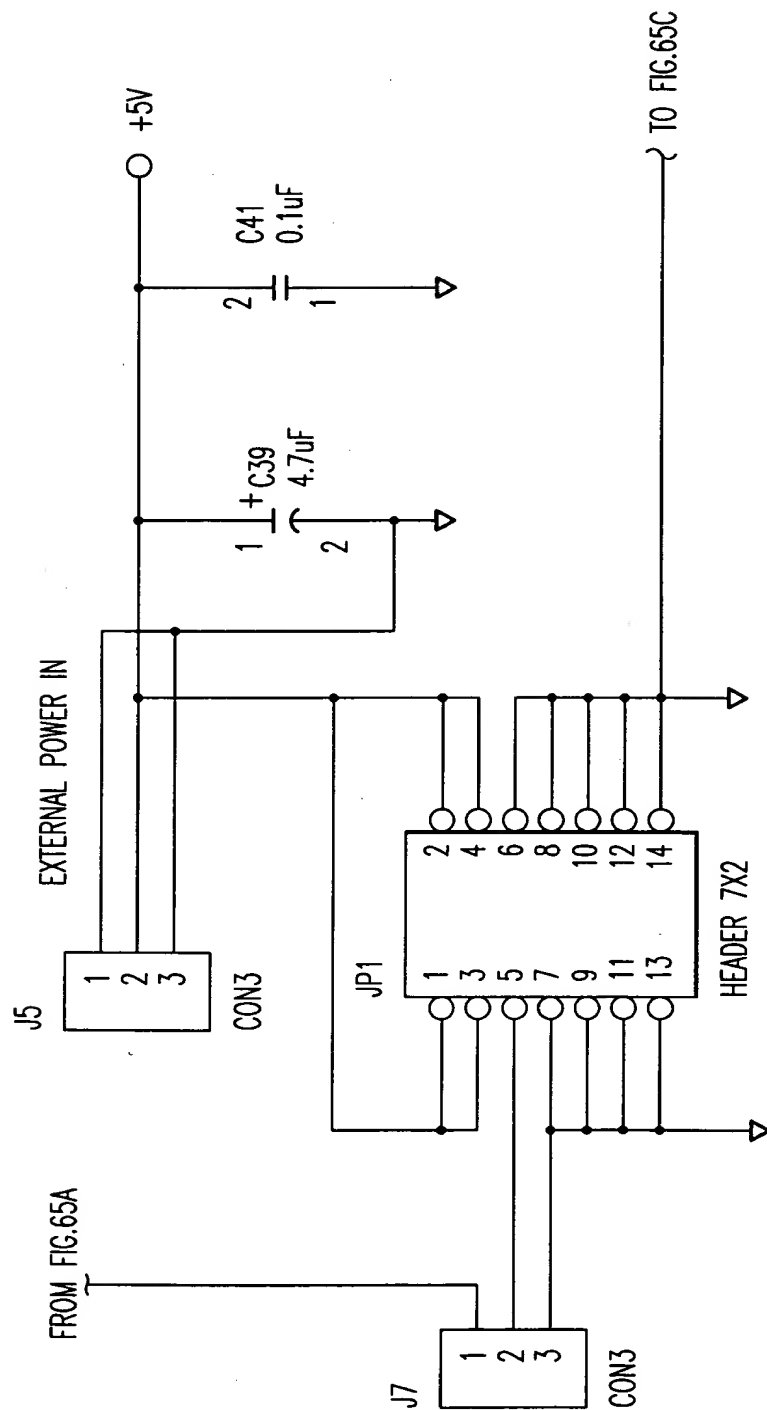


FIG. 65B

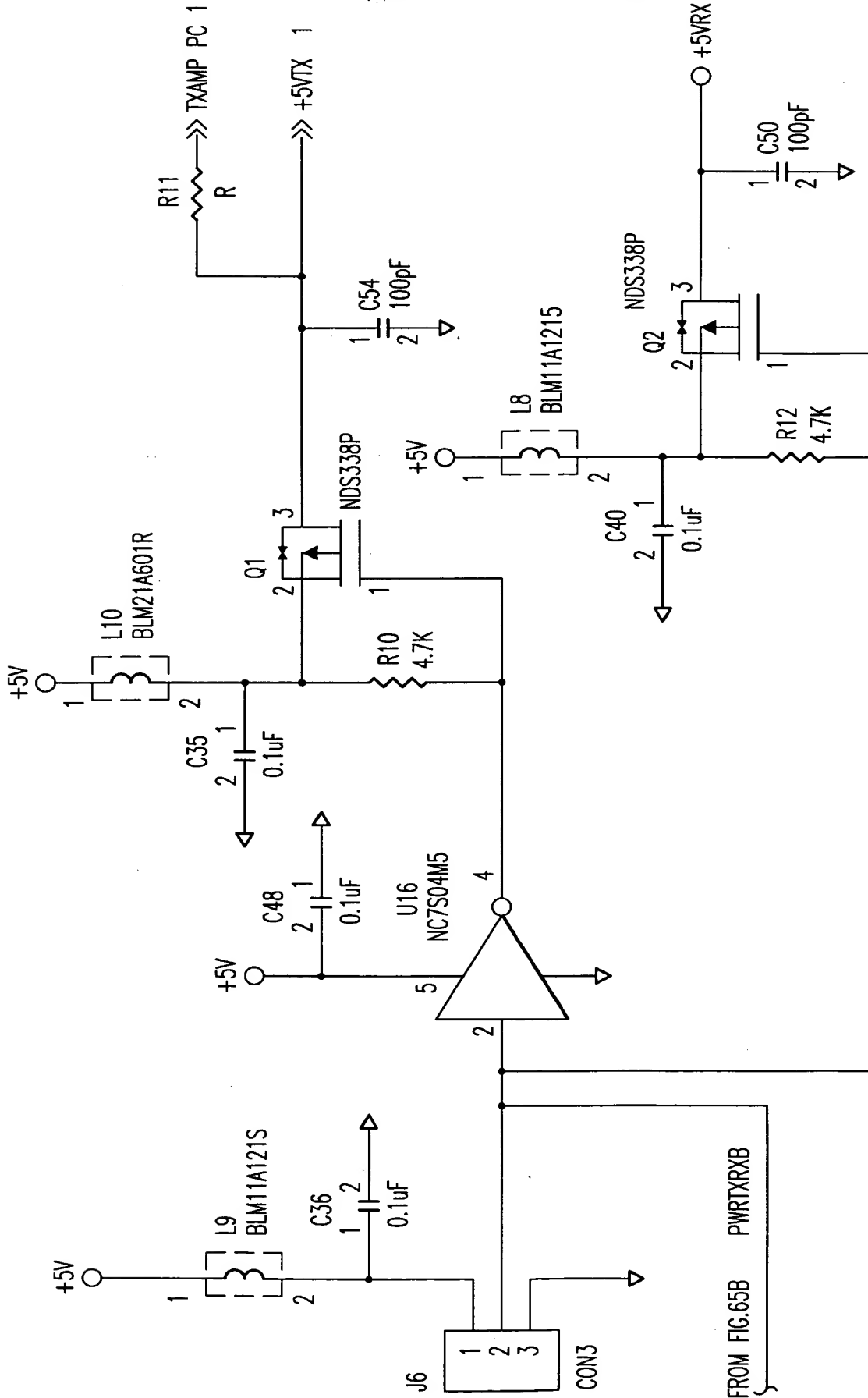


FIG. 65C

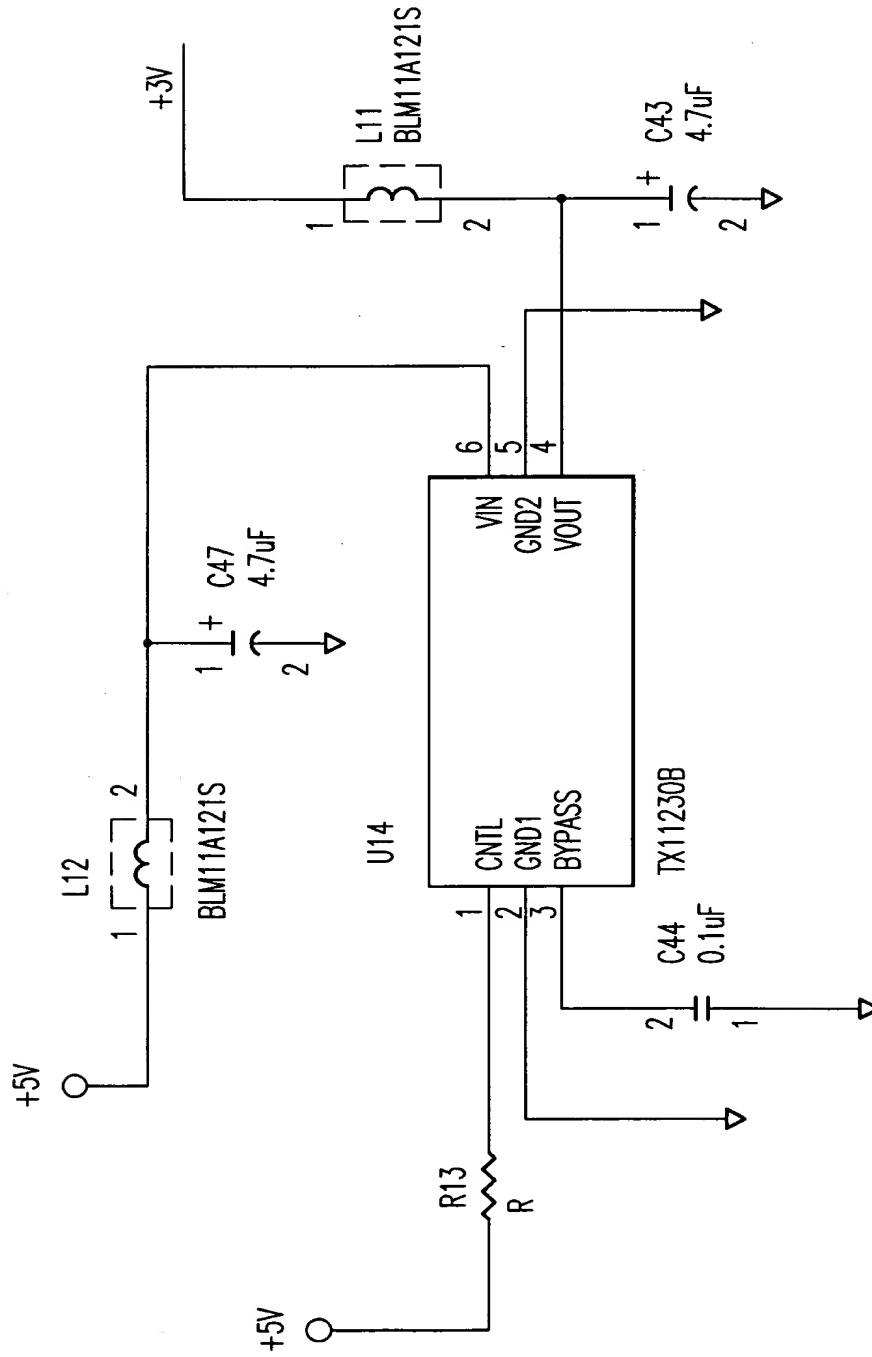
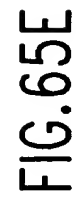


FIG. 65D



ITEM	QTY	REFERENCE	PART	MANUFACT.	PART DESCRIPTION	PART NUMBER
1	24	C1, C2, C3, C5, C6, C17, C18, C19, C20, C28, C35, C36, C37, C38, C40, C41, C44, C48, C55, C56, C57, C59, C60, C62	0.1uF	MURATA	.1uF, 0603, X7R, 20%, 16V	GRM39X7R104M016
2	1	C4	330pF	MURATA	330pF, 0603, COG, 10%, 50	GRM39C0G331K050
3	2	C10, C7	22pF	MURATA	22pF, 0603, COG, 10%, 50	GRM30C0G220K050
4	4	C8, C9, C23, C24	470pF	MURATA	470pF, 0603, COG, 10%, 50	GRM39C0G471K050
5	6	C11, C13, C25, C26, C27, C46	10pF	MURATA	10pF, 0603, COG, 10%, 50	GRM39C0G100K050
6	1	C12	8pF	MURATA	8pF, 0603, COG, 10%, 50	GRM39C0G080K050
7	8	C15, C16, C21, C22, C50, C54	100pF	MURATA	100pF, 0603, COG, 10%, 50	GRM39C0G101K050
8	3	C39, C43, C47	4.7uF	PANASONIC	4.7uF TANTALUM, 16V	ECS-T1CY475R
9	1	C52	33pF	MURATA	330pF, 0603, COG, 10%, 50	GRM30C0G330K050
10	2	FL1, FL2	MDR642E	SOSHIN	2.4-2.5GHz BPF	MDR642E
11	1	JP1	HEADER 7X2	SAMTEC	DUAL ROW, 7 PINS PER ROW	FTSH-107-01-F-D
12	3	J1, J2, J3	82MMCX-50-0-1	SUHER	RF CONNECTOR	82MMCX-50-0-1
13	6	J4, J5, J6, J7, J9, J10	CON3	BERG	3 PIN HEADER W RETENTIVE LEG	69190-403H
14	2	L10, L1	BLM21A601R	MURATA	600 OHMS@100MHz, 500mA FERRITE BEAD	BLM21A601R
15	4	L2, L3, L5, L6	22nH	COILCRAFT	22nH, 0805CS (2012), 5%	0805CS-220X-BC
16	9	L7, L8, L9, L11, L12, L13, L14, L15, L16	BLM11A121S	MURATA	RF BEAD	BLM11A121S
17	4	Q1, Q2, Q3, Q4	NDS336P	NATIONAL	P-CHANNEL FET	NDS336P
18	12	R1, R2, R5, R6, R7, R9, R11, R13, R16, R17, R18, R19	R	PANASONIC		
19	2	R3, R4	100	PANASONIC	0603, 100, 5%, 1/16W	ERJ-3GSY-J-101
20	5	R10, R12, R15, R20, R21	4.7K	PANASONIC	0603, 4.7K, 5%, 1/16W	ERJ-3GSY-J-472

FIG. 66A

21	1	R14	3.6K	PANASONIC	0603, 3.6K, 5%, 1/16W	ERJ-36SY-J-362
22	1	T1	80 OHM, L=100 MIL, W=20 MIL			
23	1	T2	50 OHM, L=100 MIL, W=54 MIL			
24	1	T3	102 OHM, L=220 MIL, W=10 MIL			
25	1	T4	67 OHM, L=200 MIL, W=30.7 MIL			
26	1	T5	100 OHM, L=200 MIL, W=10.7 MIL			
27	4	U2, U3, U6, U7	MAAM22010	MACOM	2.4-2.5 GHz LNA	MAAM22010
28	1	U4	UPG152TA	NEC	RF SWITCH	UPG152TA
29	5	U11, U12, U16, U18, U19	NC7S04M5	NATIONAL	INVERTER	NC7S04M5
30	1	U14	TKN11230B	TOKO	VOLTAGE REGULATOR	TK11230B
31	1	U17	RF2128P	RFMD	MEDIUM POWER LINEAR AMPLIFIER	RF2128P
32	1				BOARD	B500.641.024 VOL.

FIG. 66B

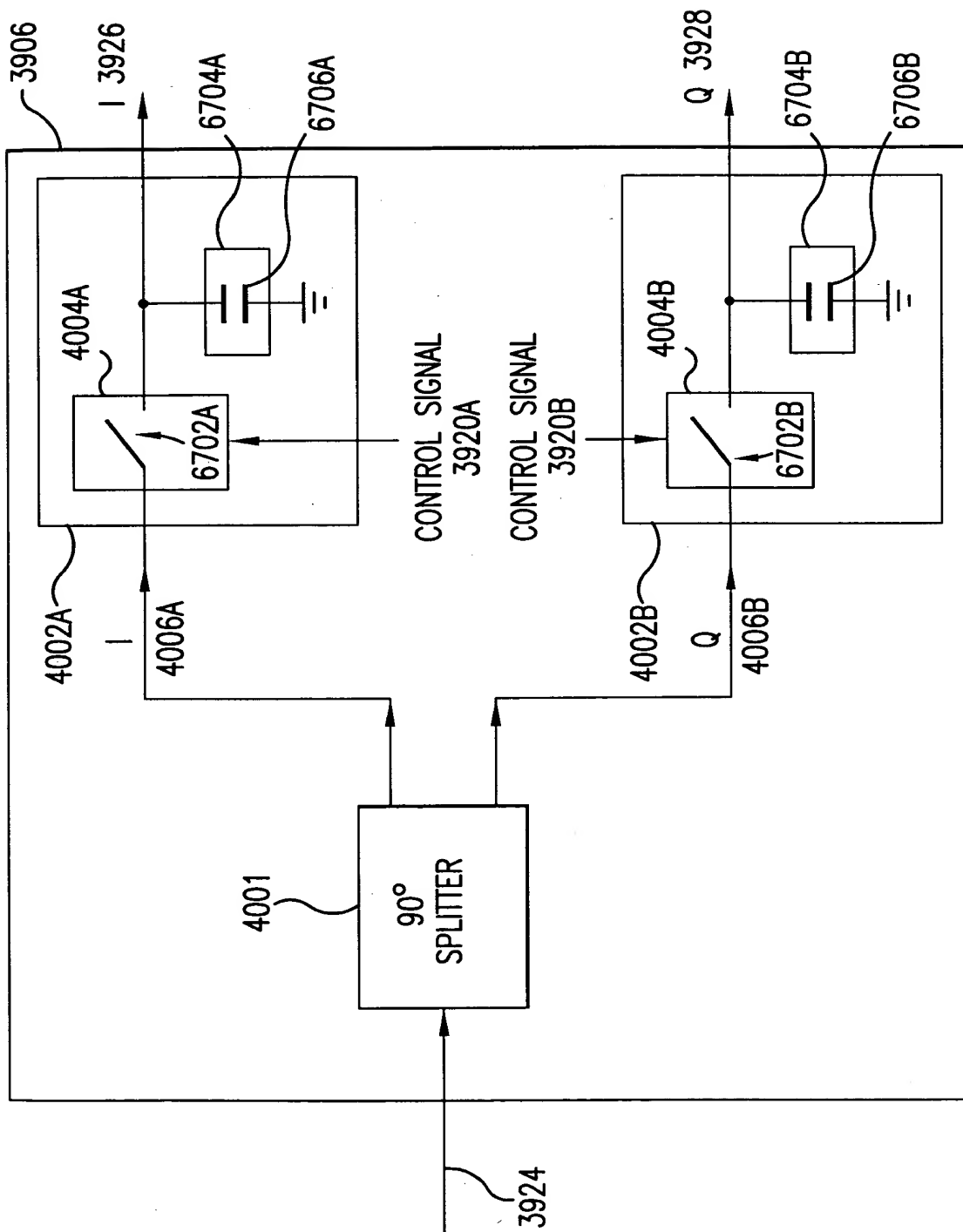


FIG. 67A



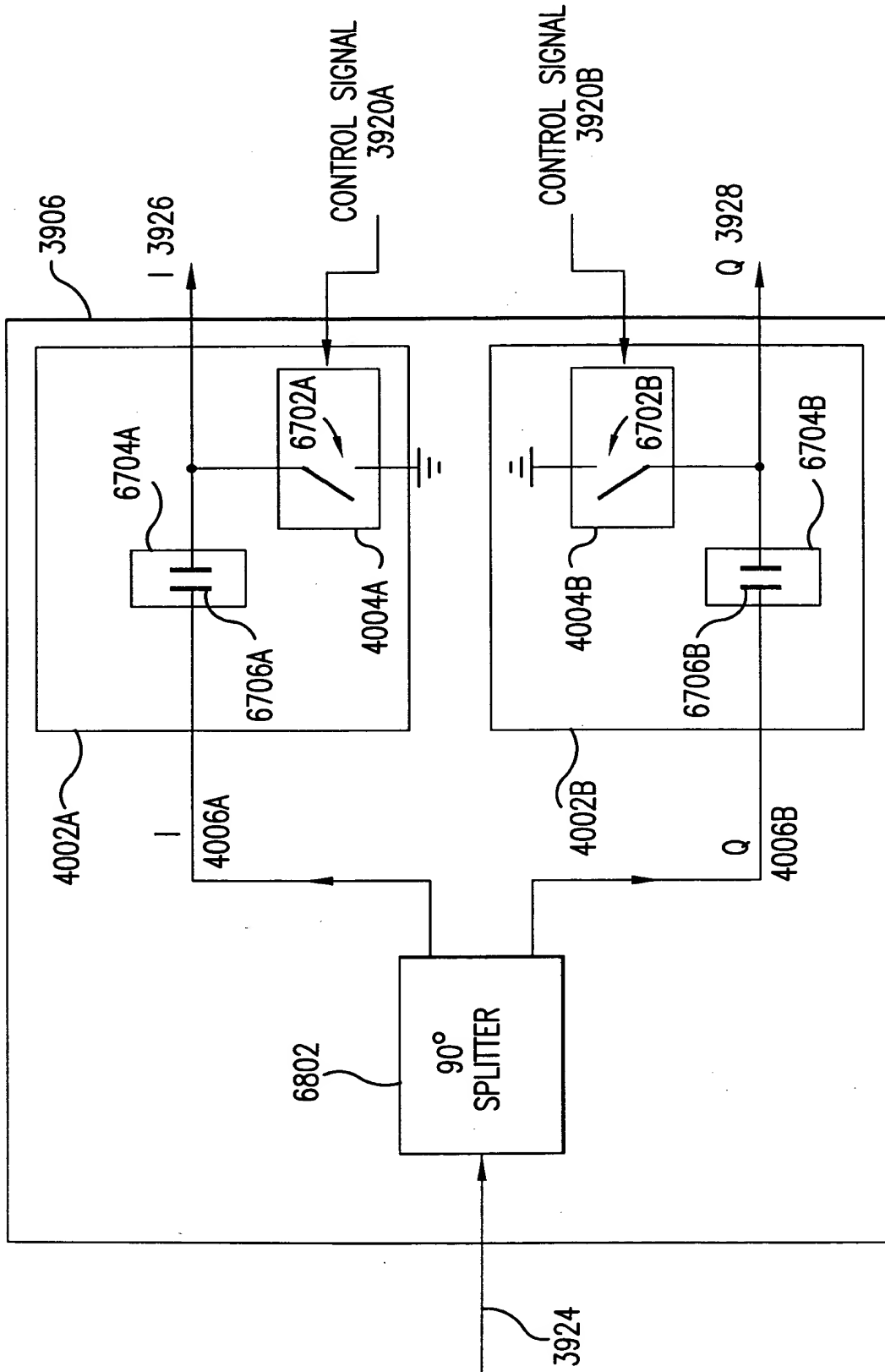


FIG. 67B

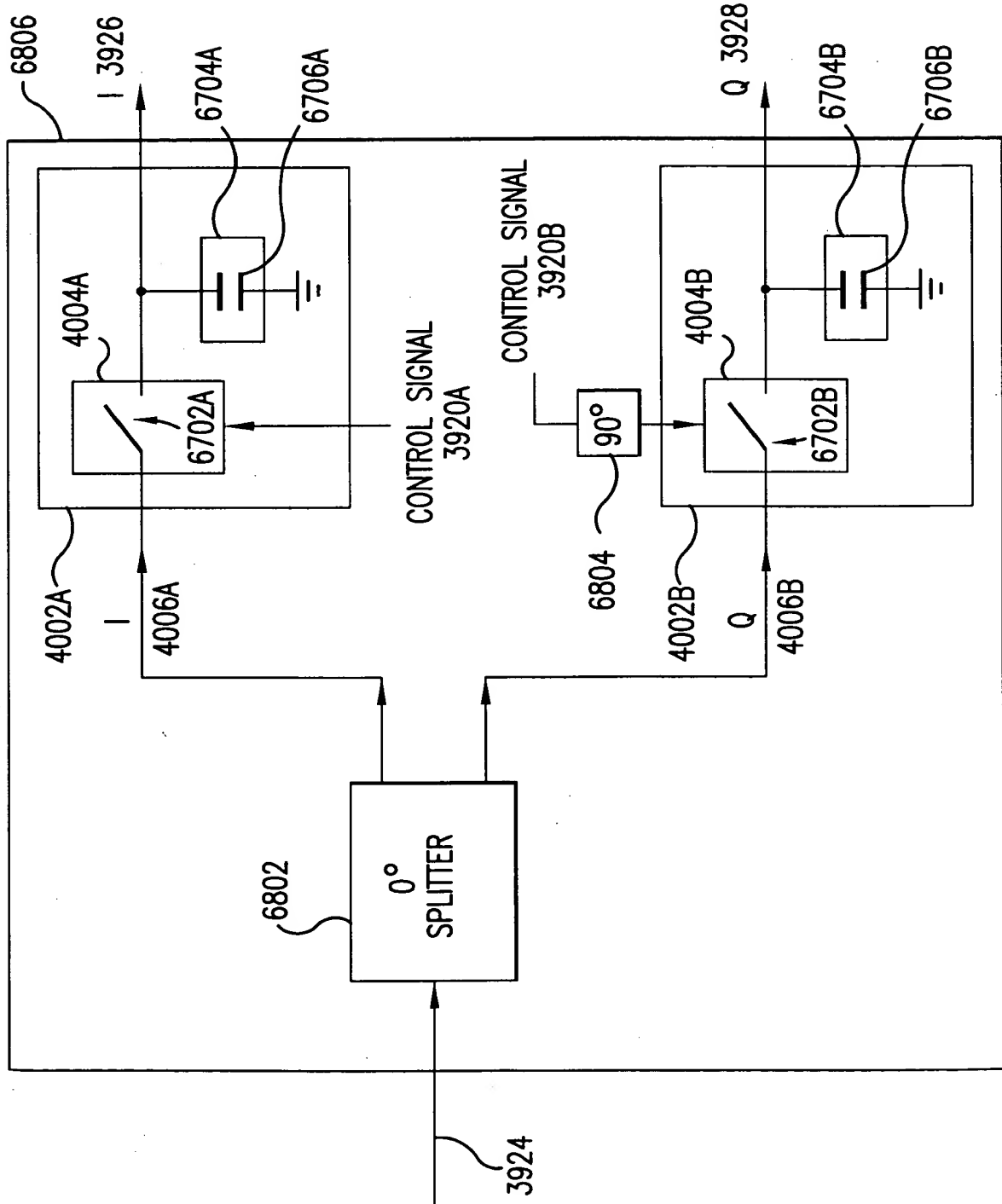


FIG. 68A

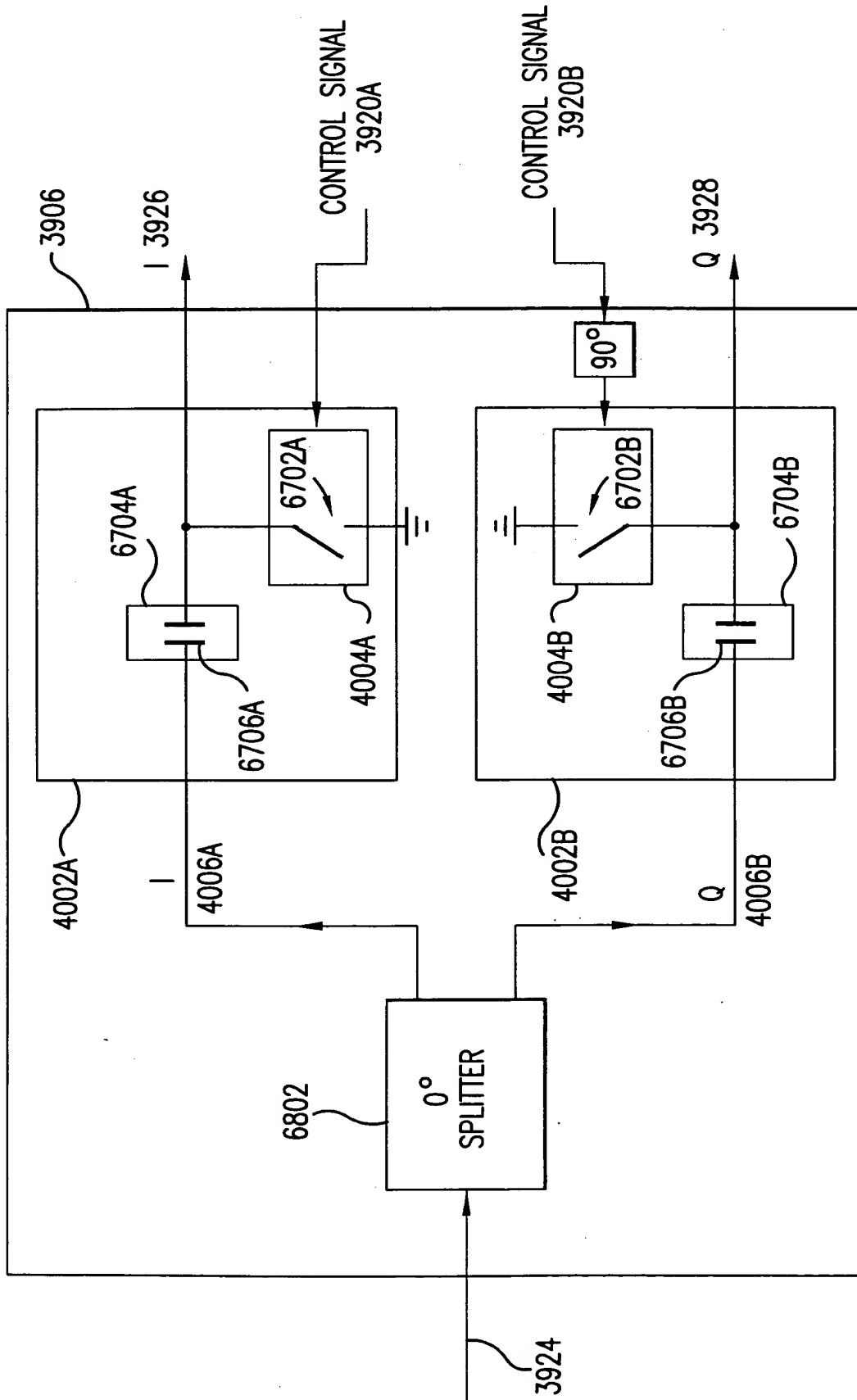


FIG. 68B

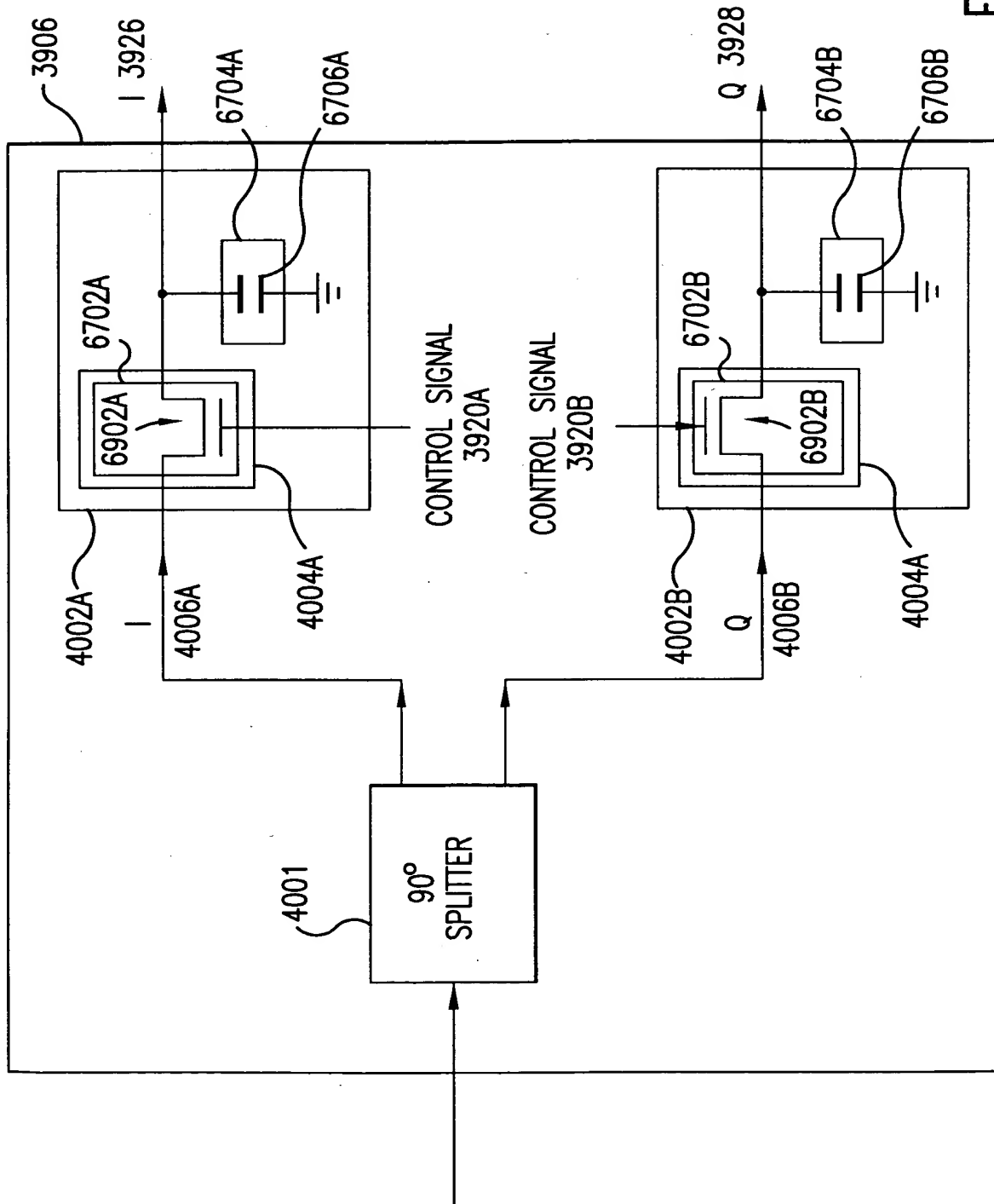


FIG. 69A

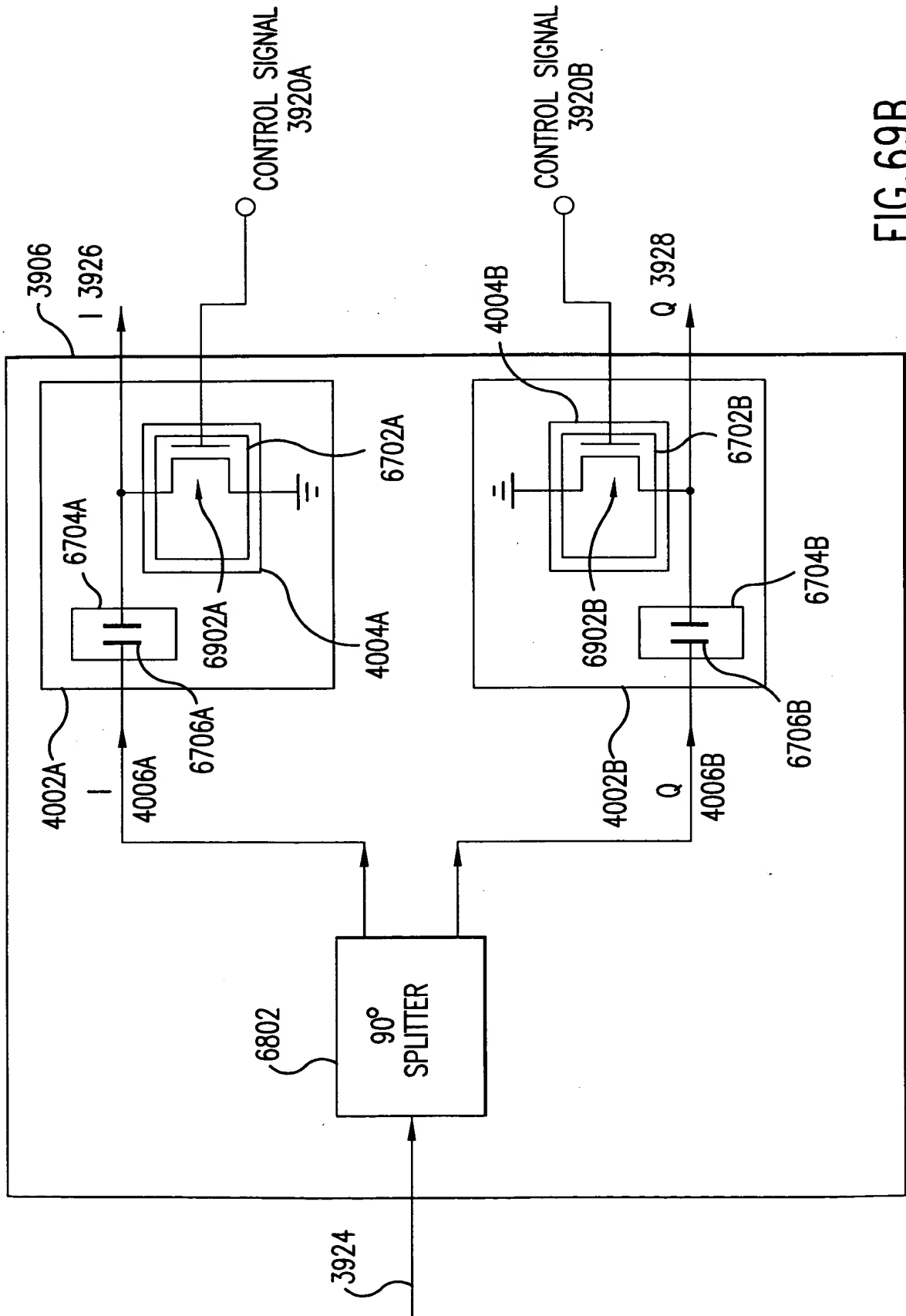


FIG. 69B

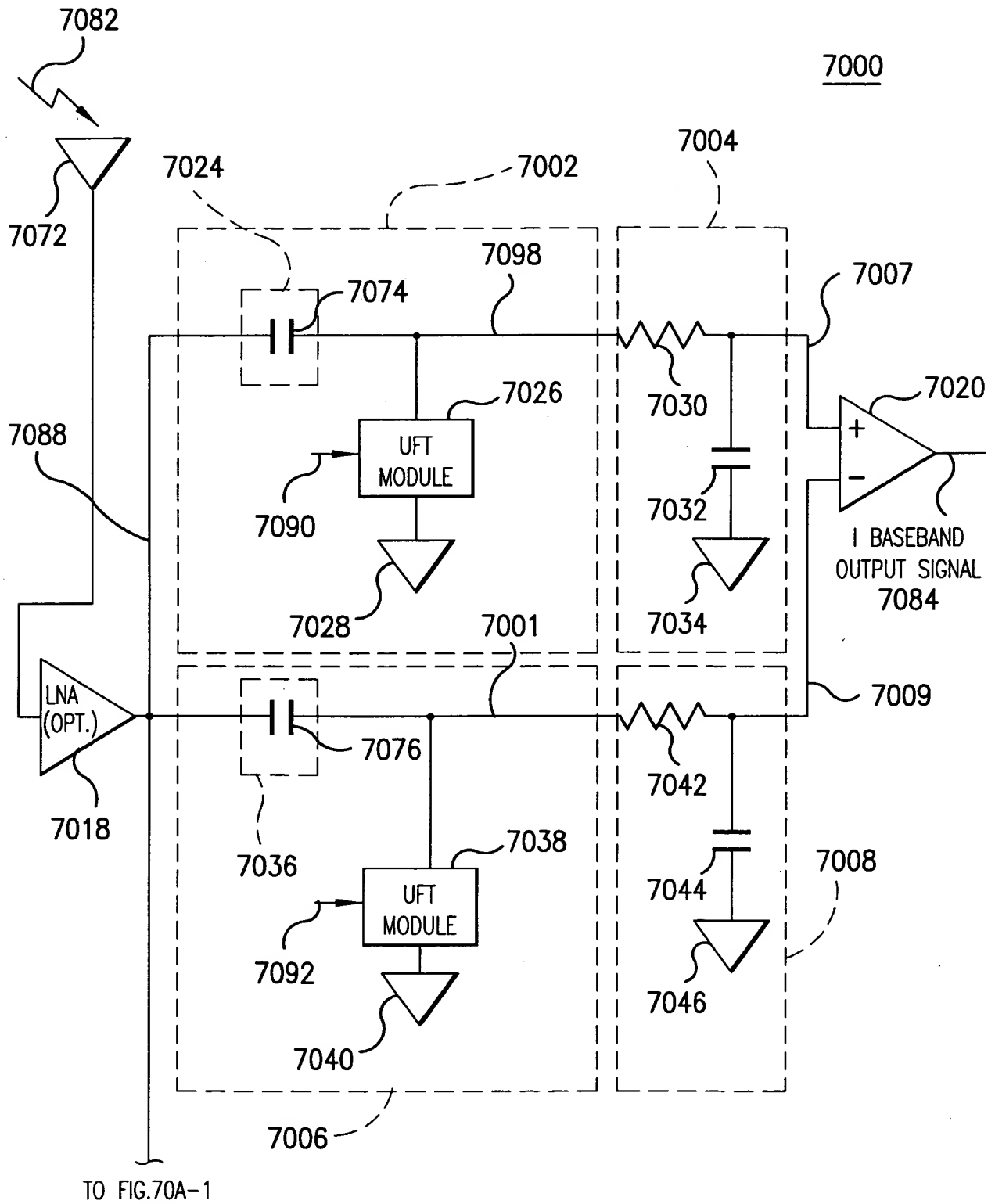


FIG.70A

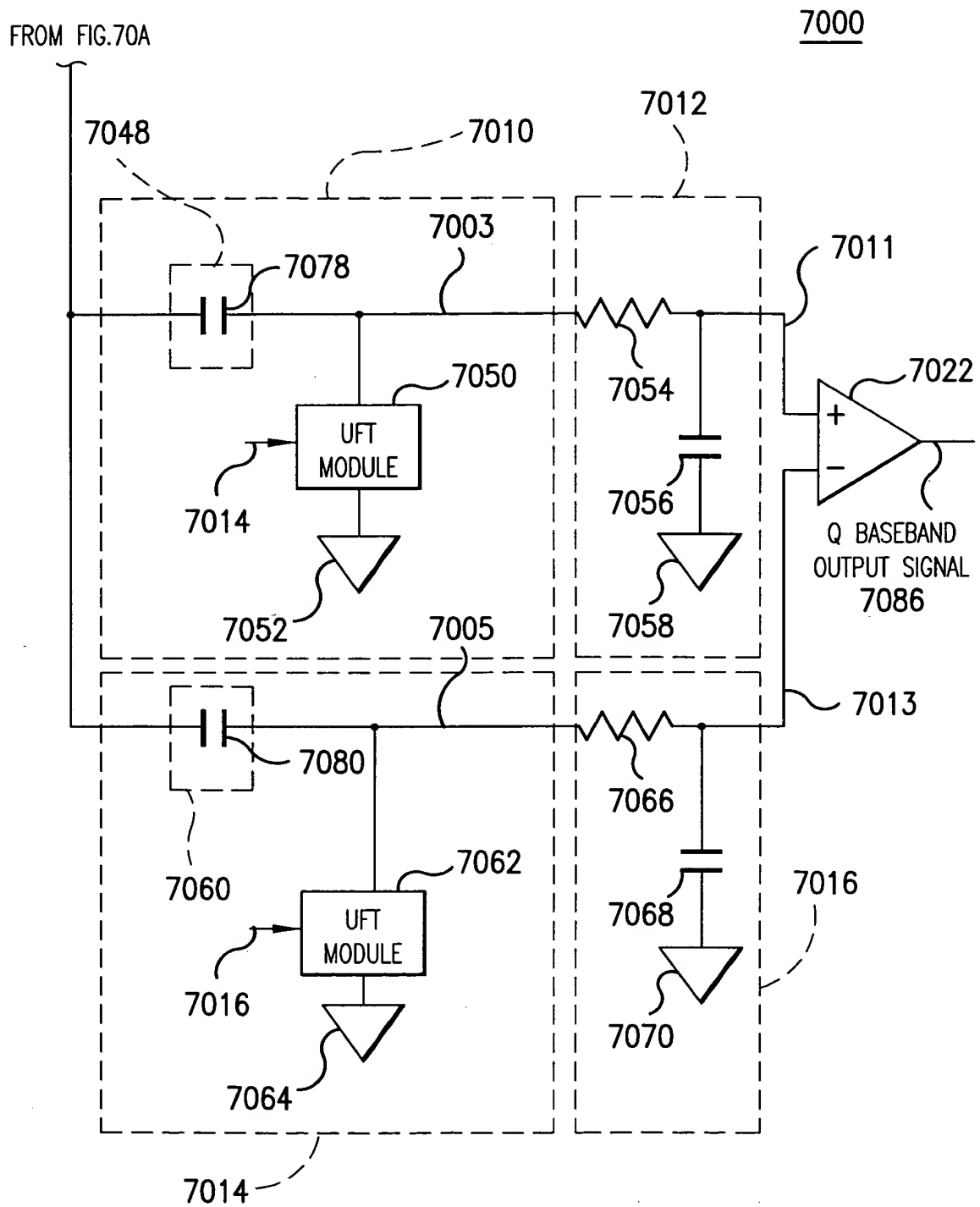


FIG.70A-1



FIG. 70B



LOCAL OSCILLATOR  
SIGNAL 7015

HALF FREQUENCY LO  
SIGNAL 7017

PHASE SHIFTED LO  
SIGNAL 7019

HALF FREQUENCY  
PHASE SHIFTED LO  
SIGNAL 7021

I CONTROL SIGNAL  
7090

INVERTED I CONTROL  
SIGNAL 7092

Q CONTROL SIGNAL  
7094

INVERTED Q CONTROL  
SIGNAL 7096

COMBINED CONTROL  
SIGNAL 7045

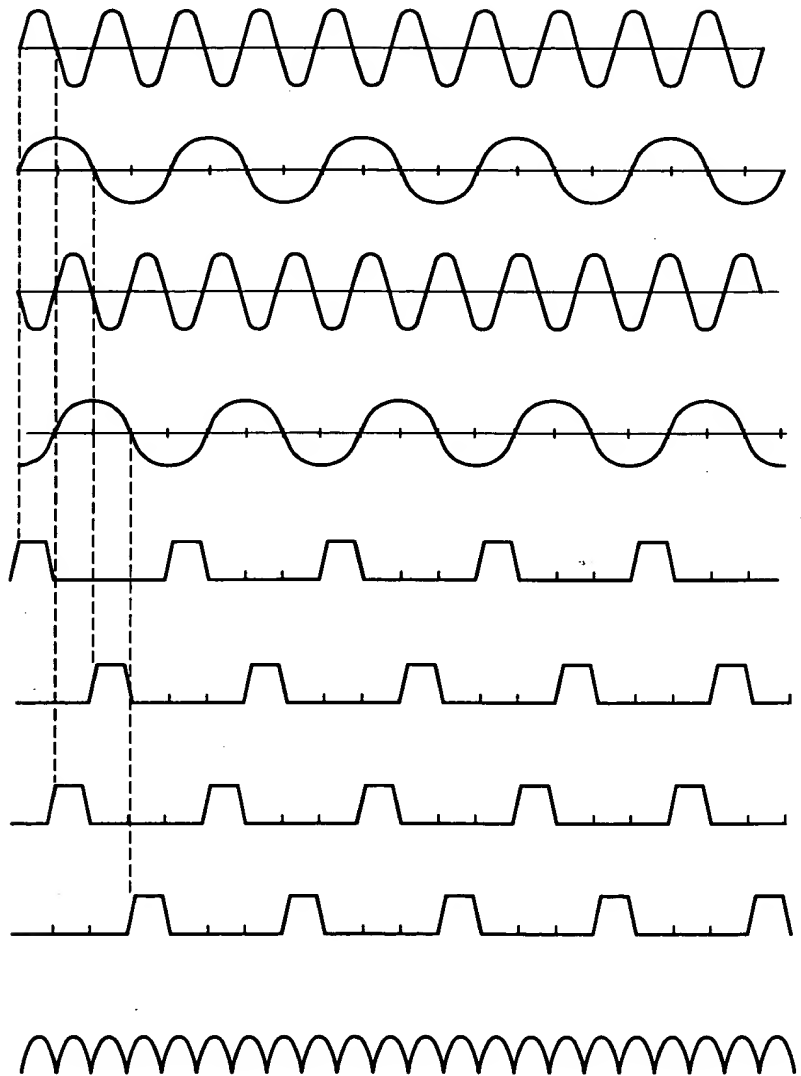


FIG.70C

(A) IQDEMOD PULSE RELATIONSHIPS TO INPUT RF CARRIER

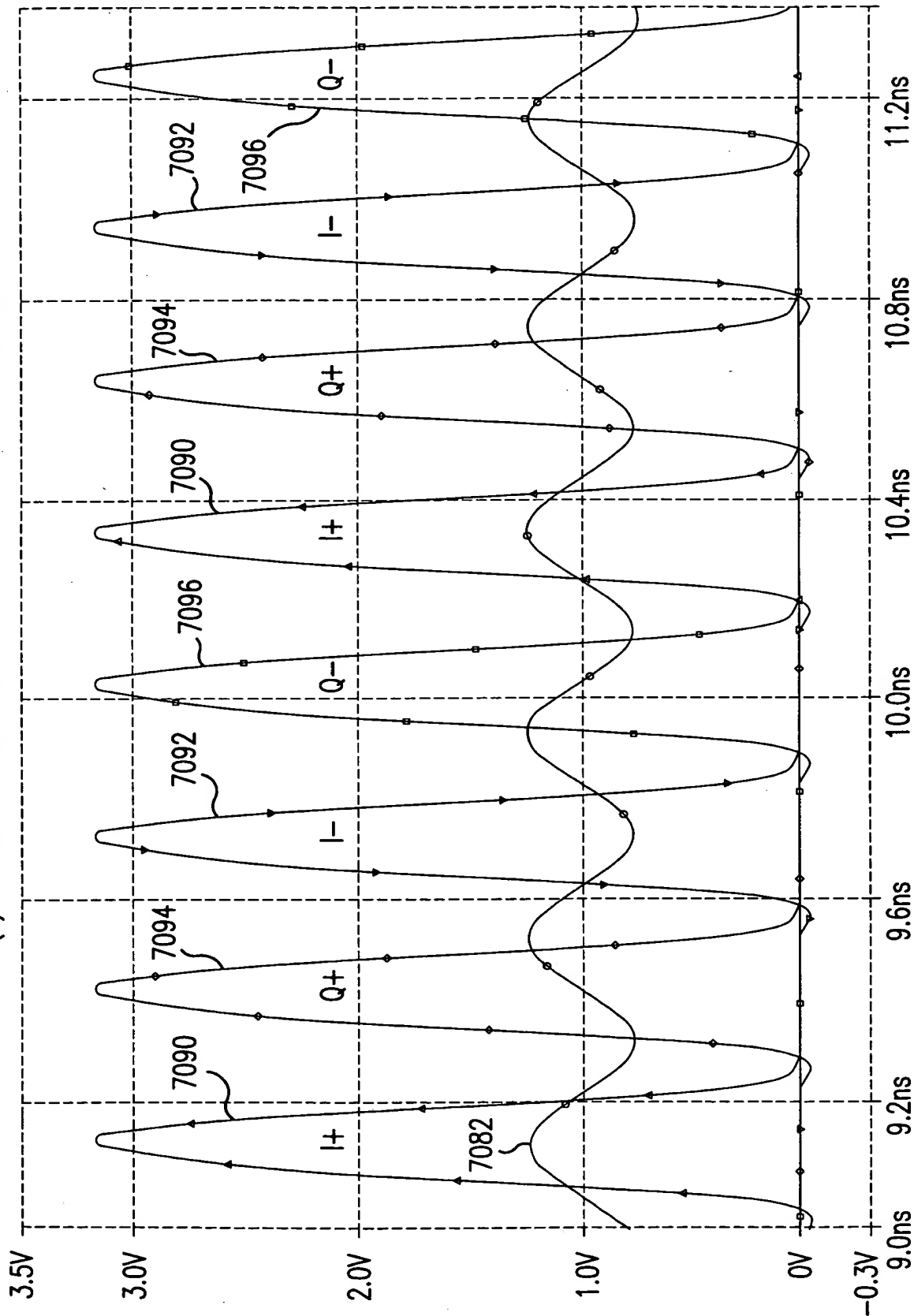
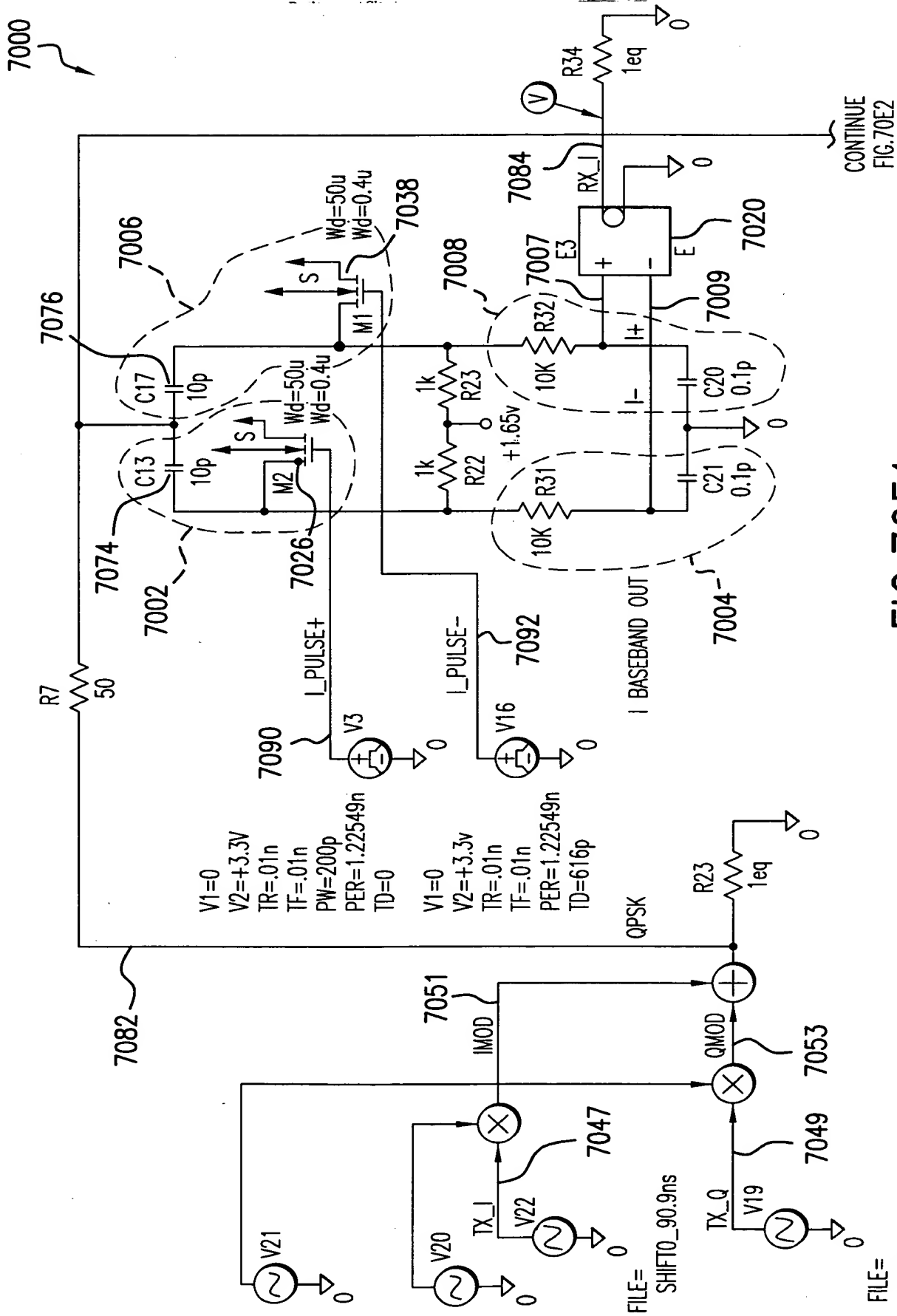


FIG.70D



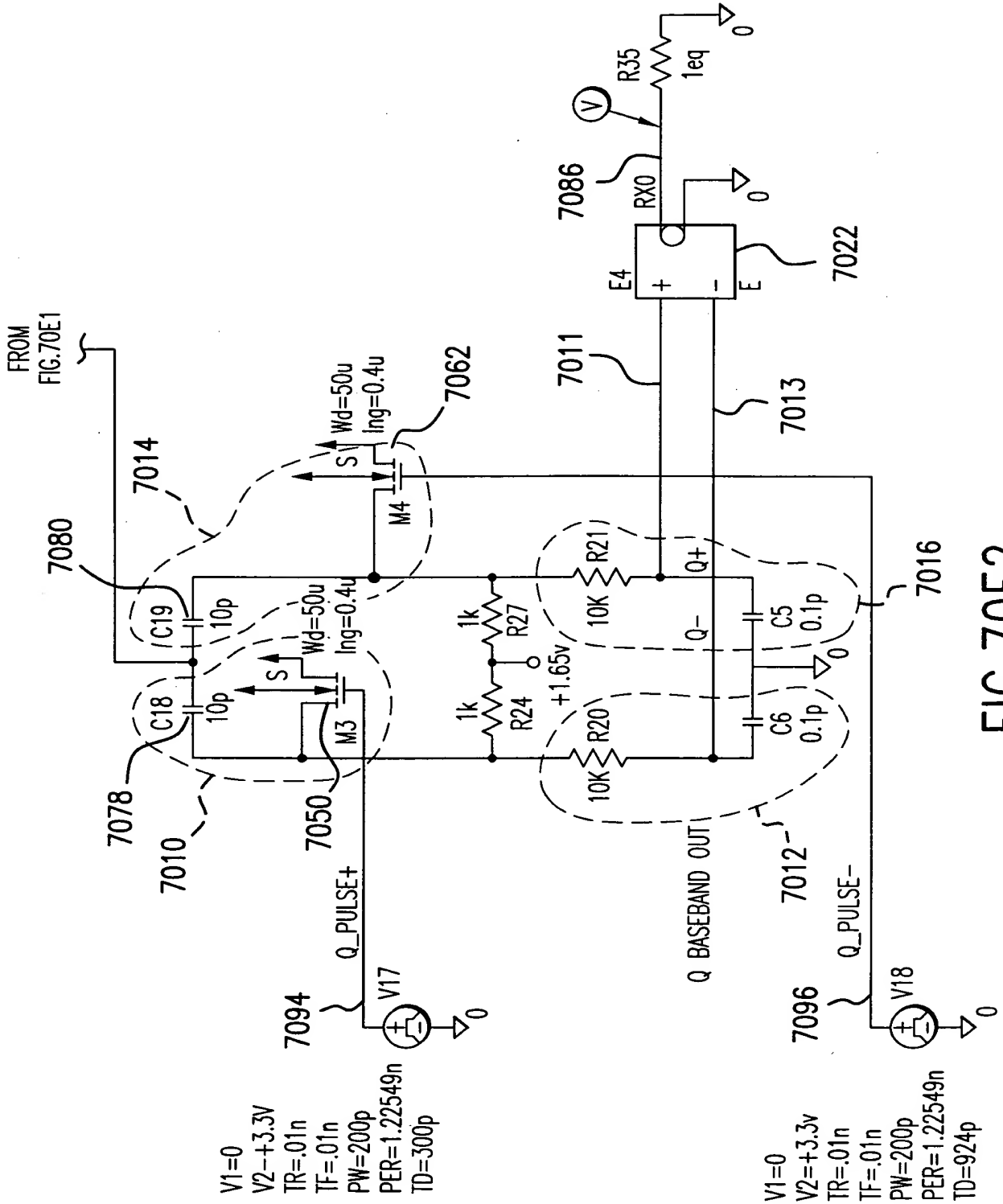


FIG. 70E2

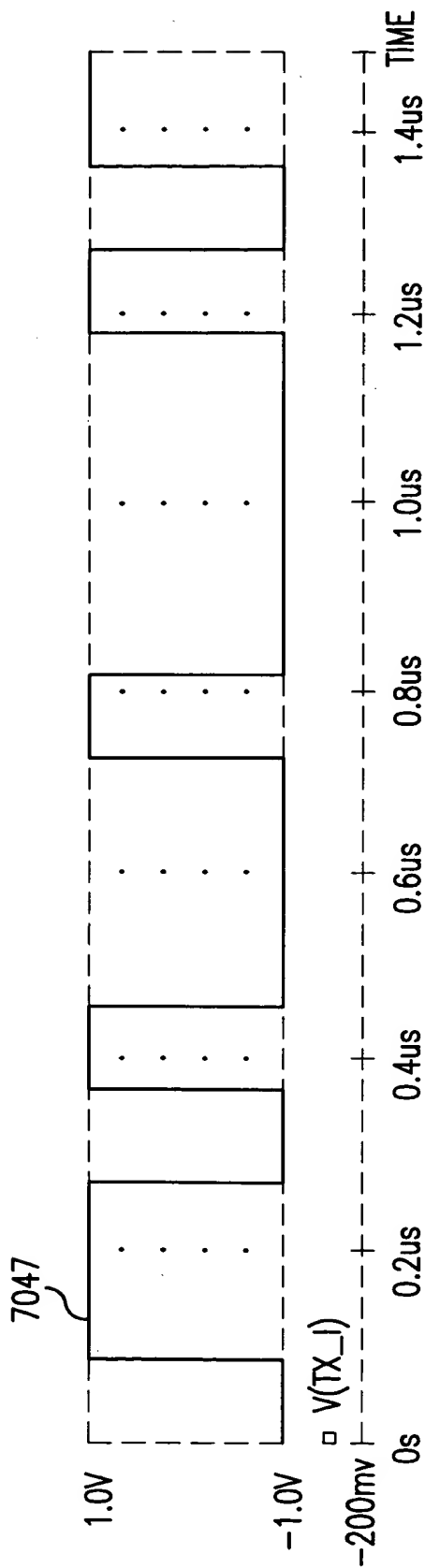


FIG. 70F

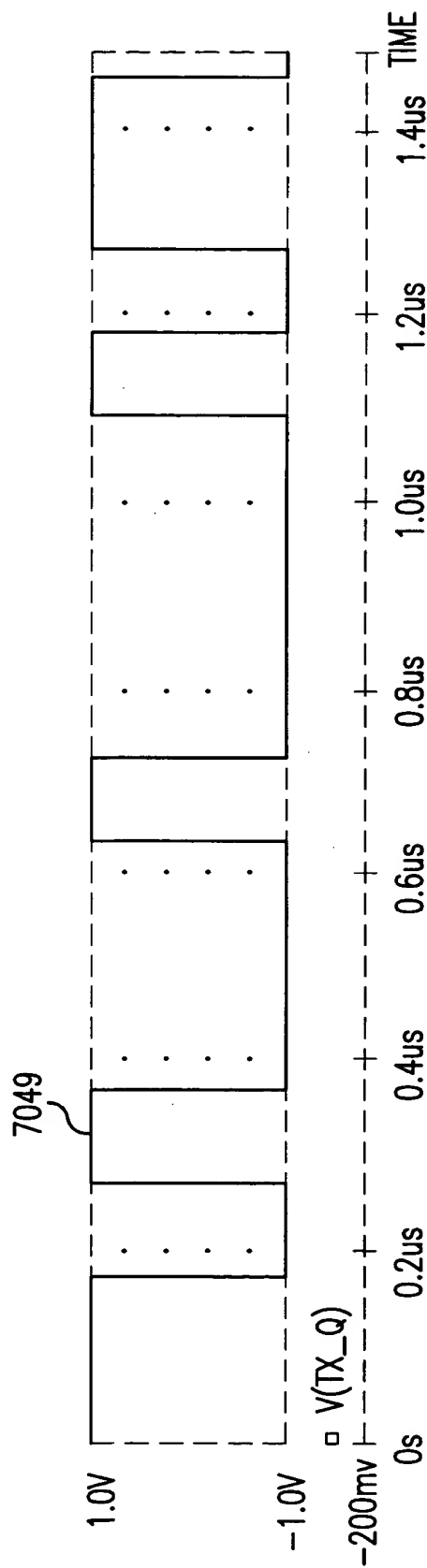


FIG. 70G

FIG. 70H

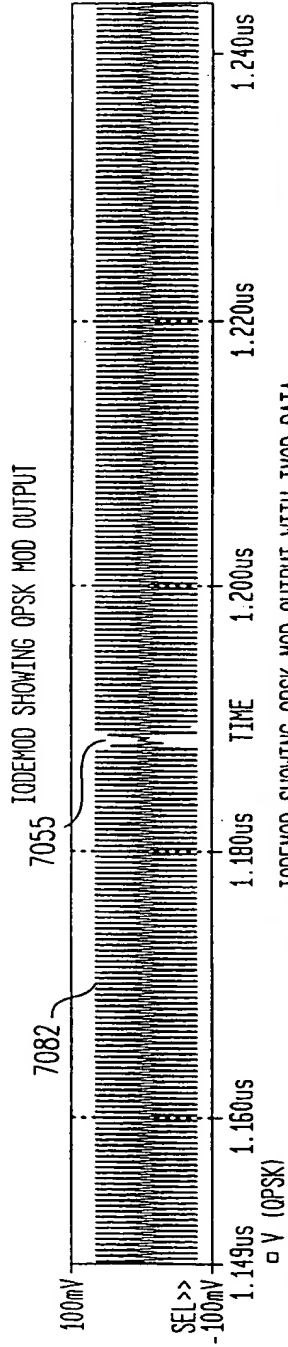


FIG. 70I



FIG. 70J

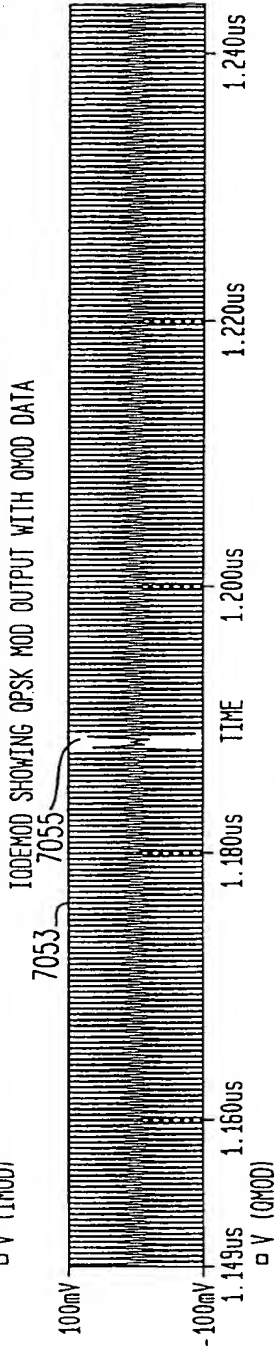


FIG. 70K

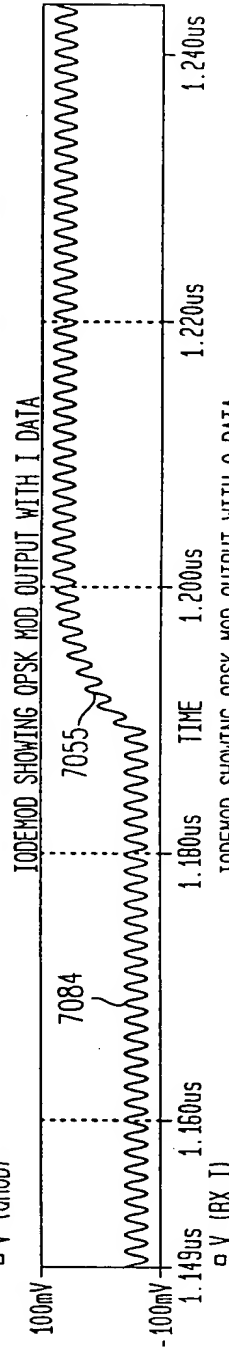
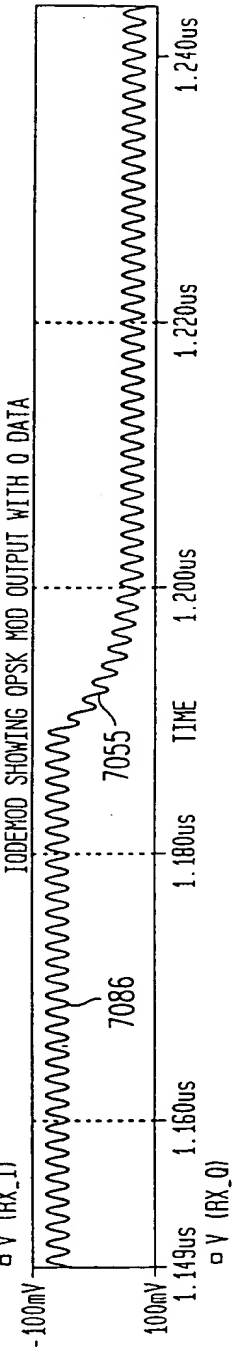
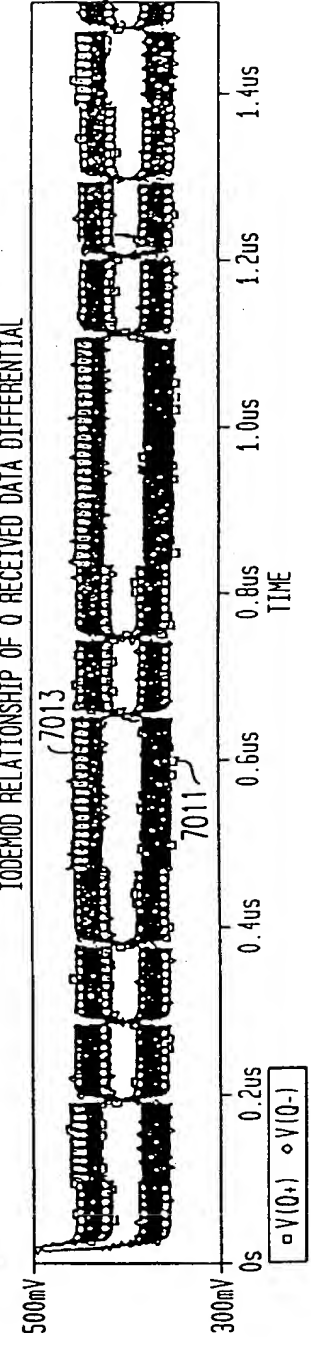
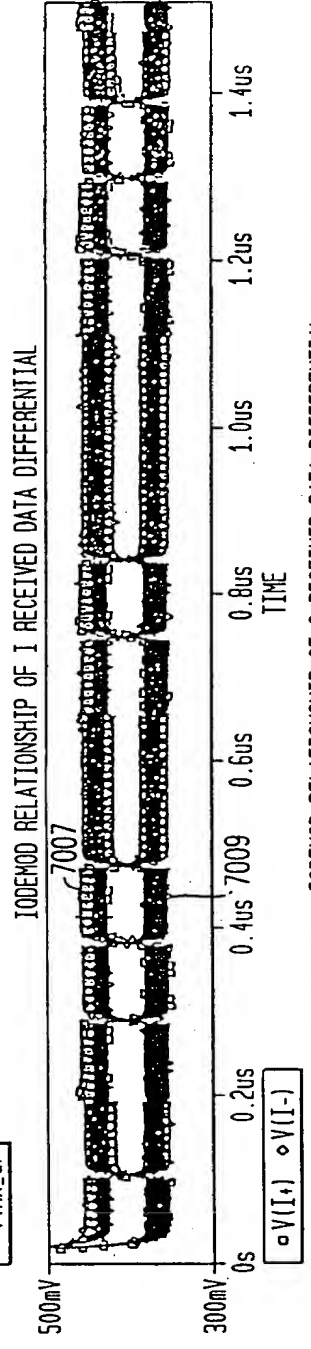
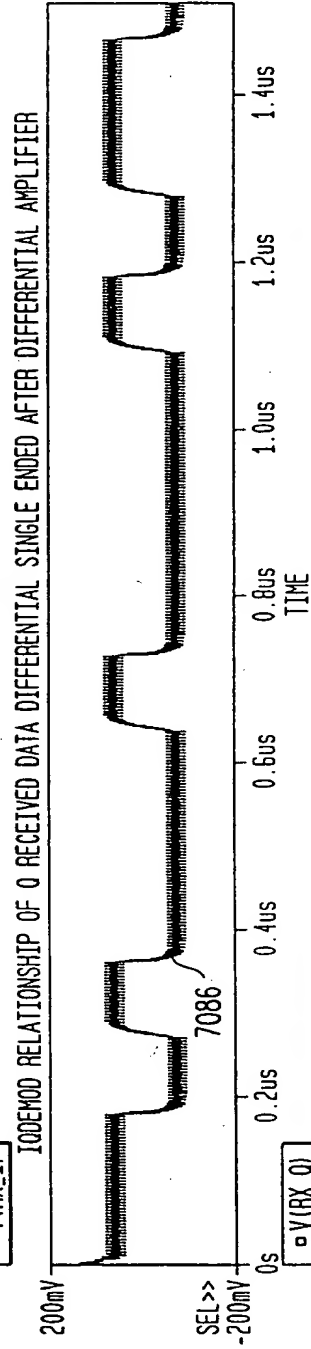
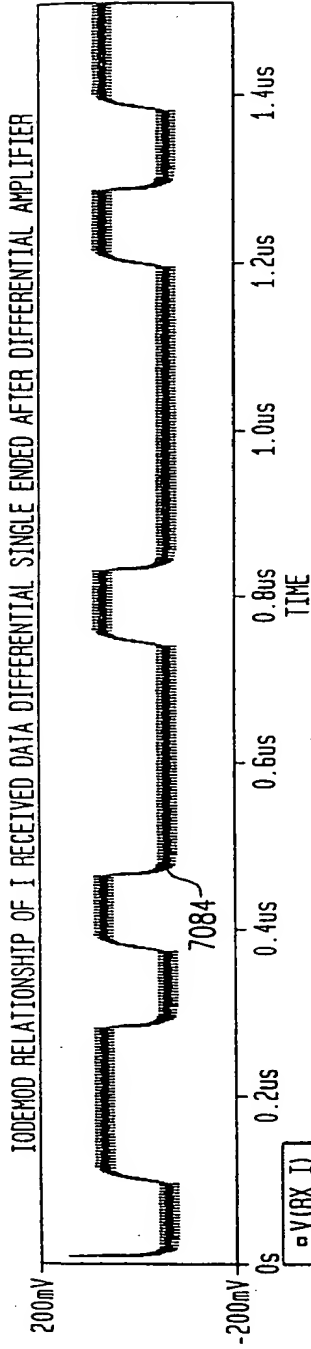


FIG. 70L





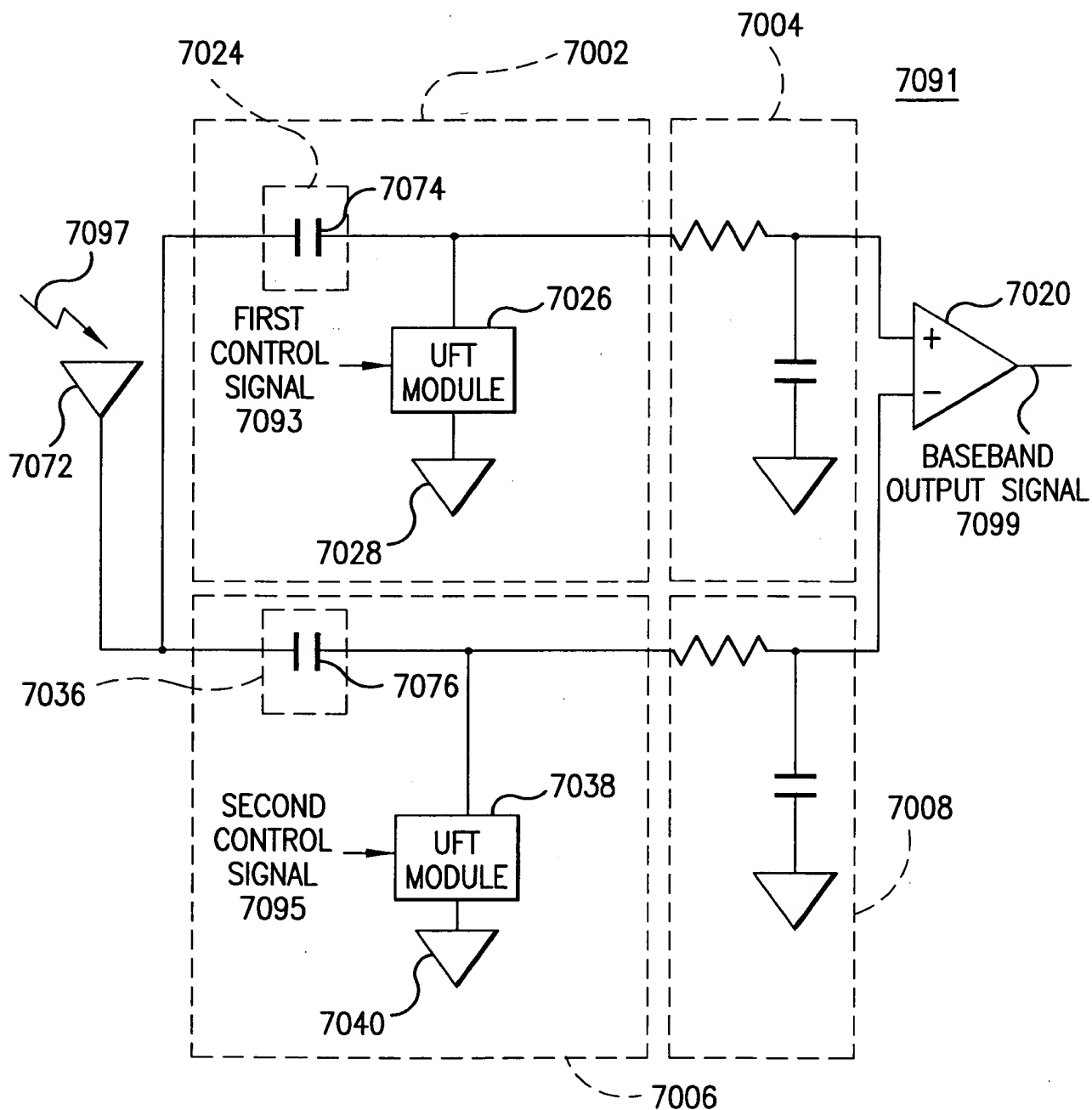
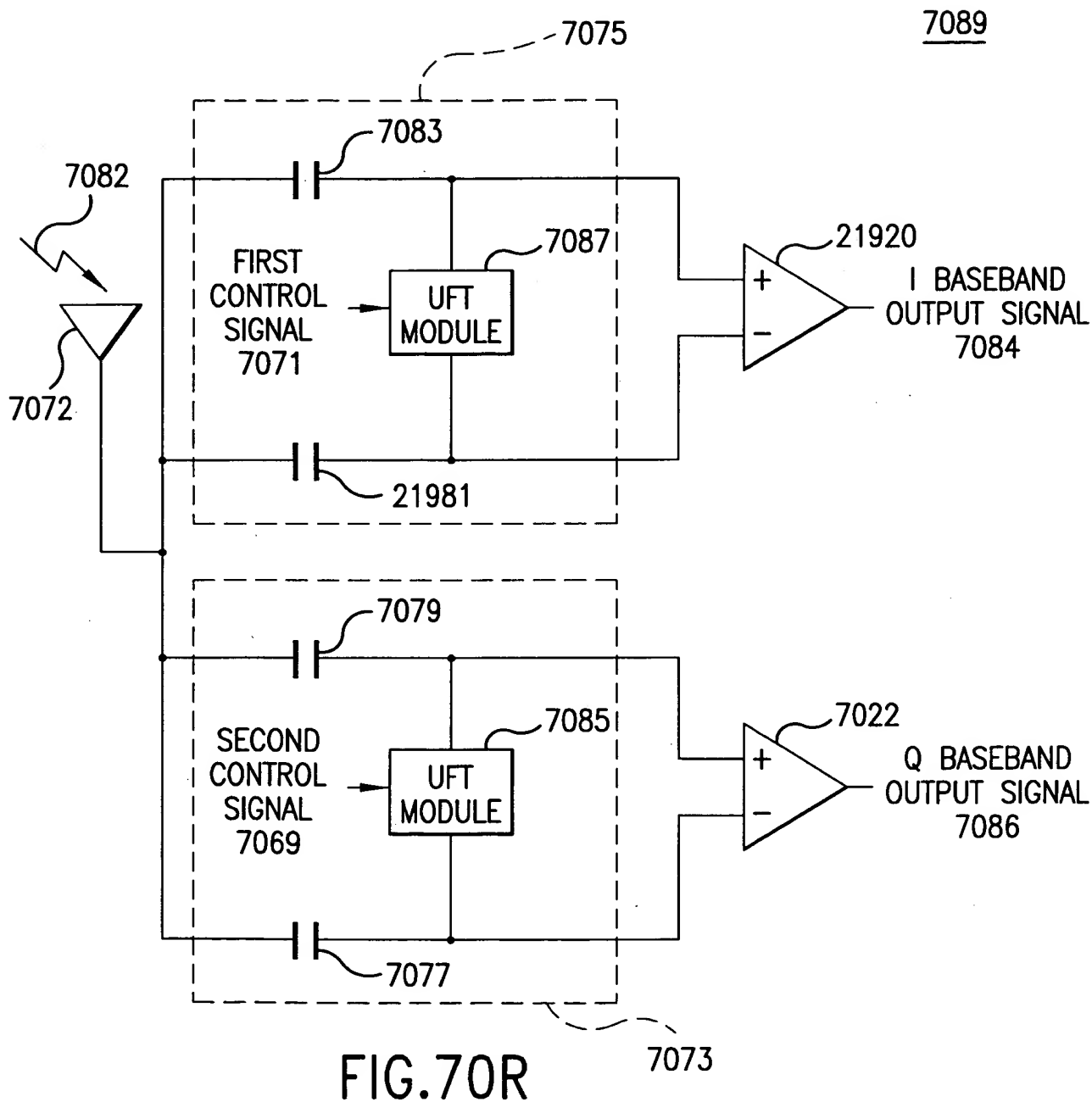
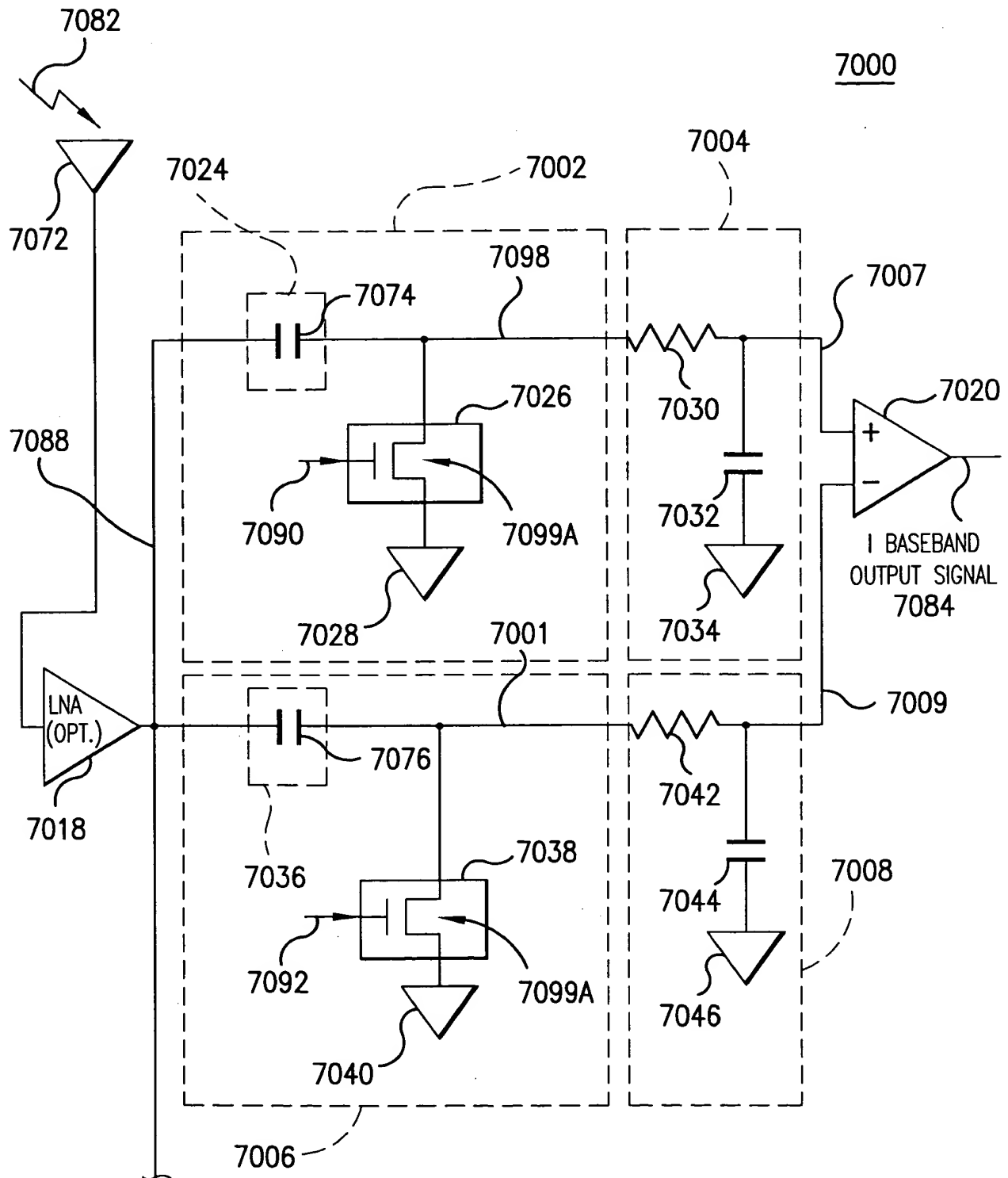


FIG. 70Q







TO FIG.70S-1

FIG.70S

FROM FIG.70S

7000

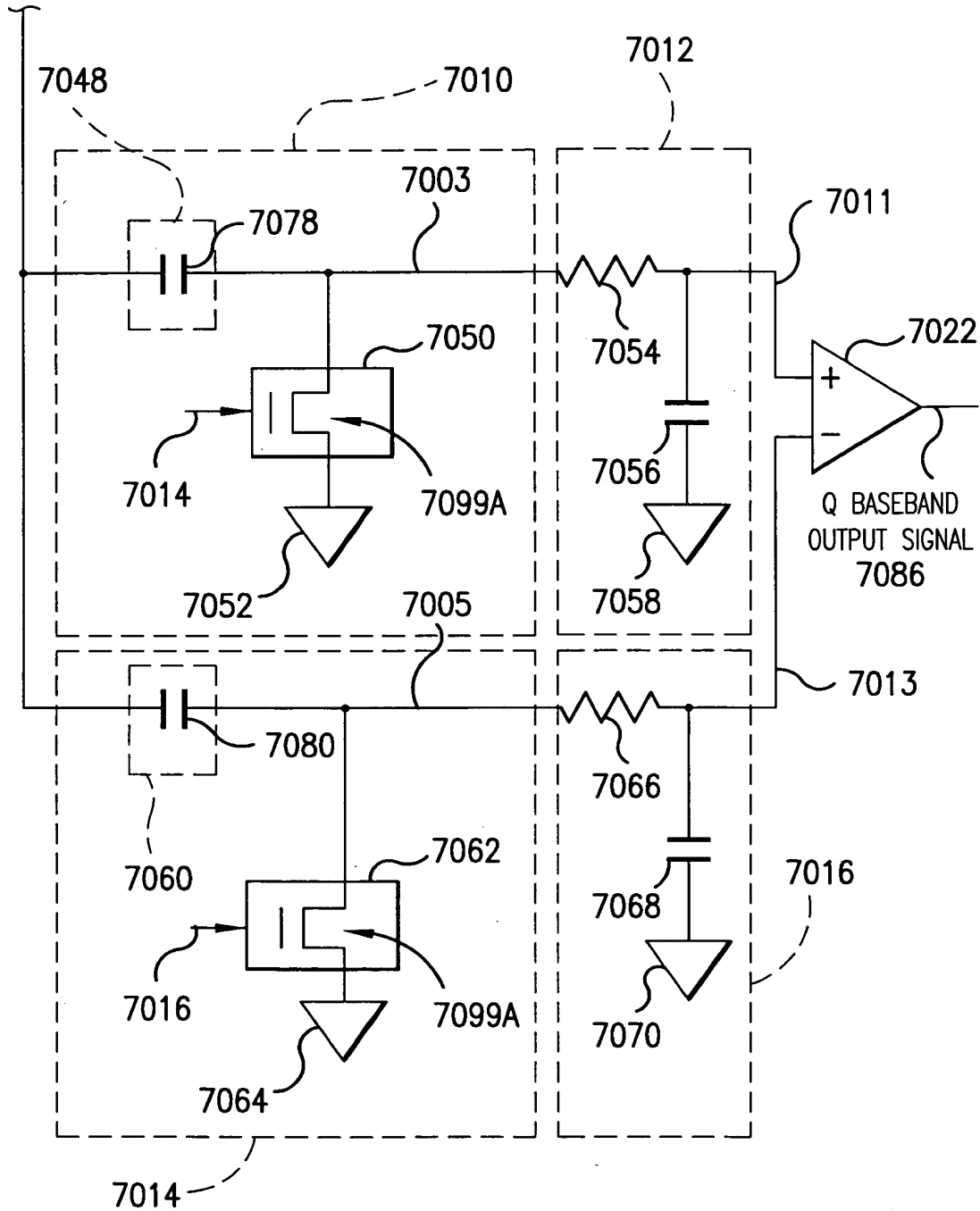


FIG.70S-1

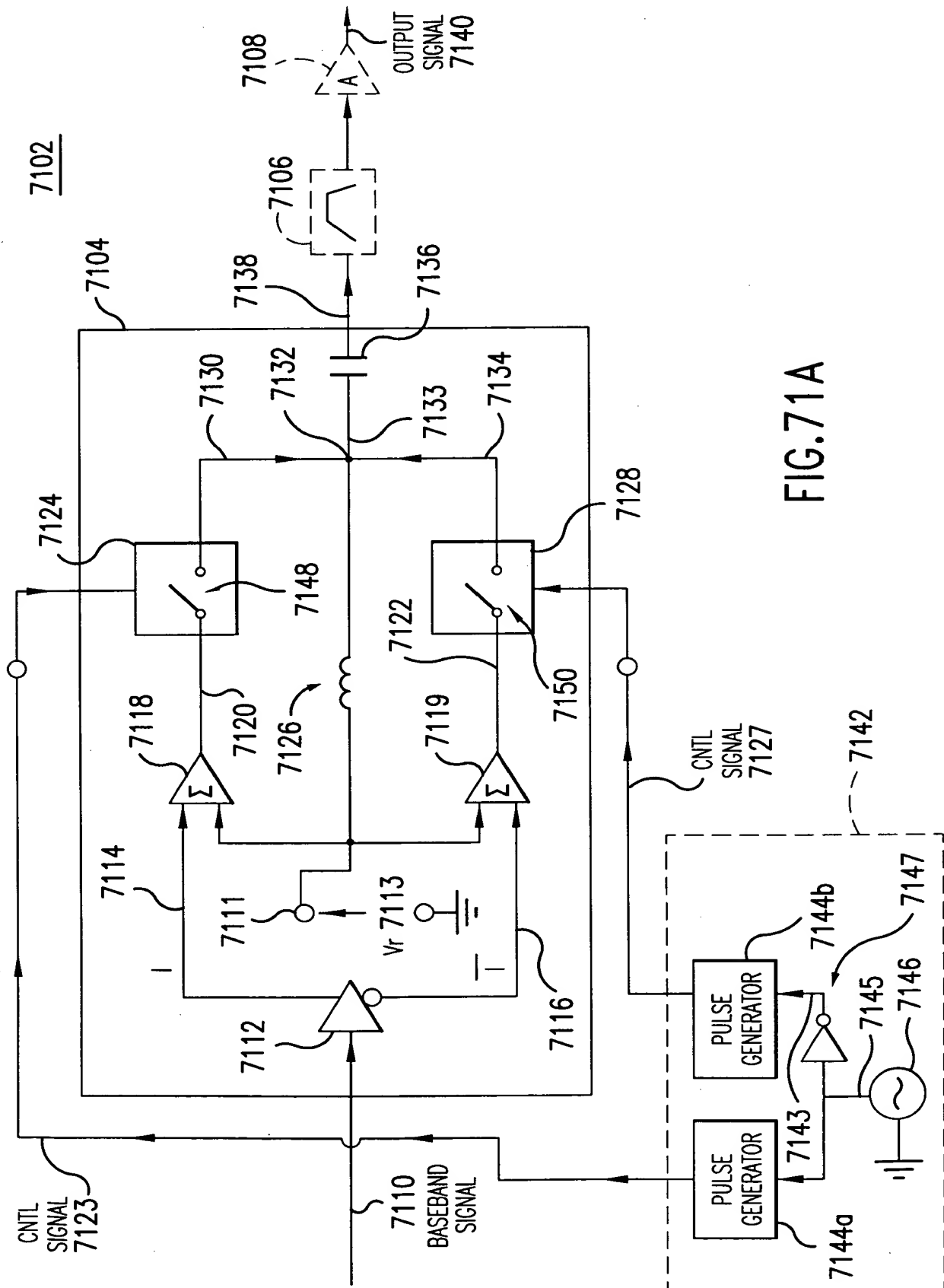


FIG. 711A

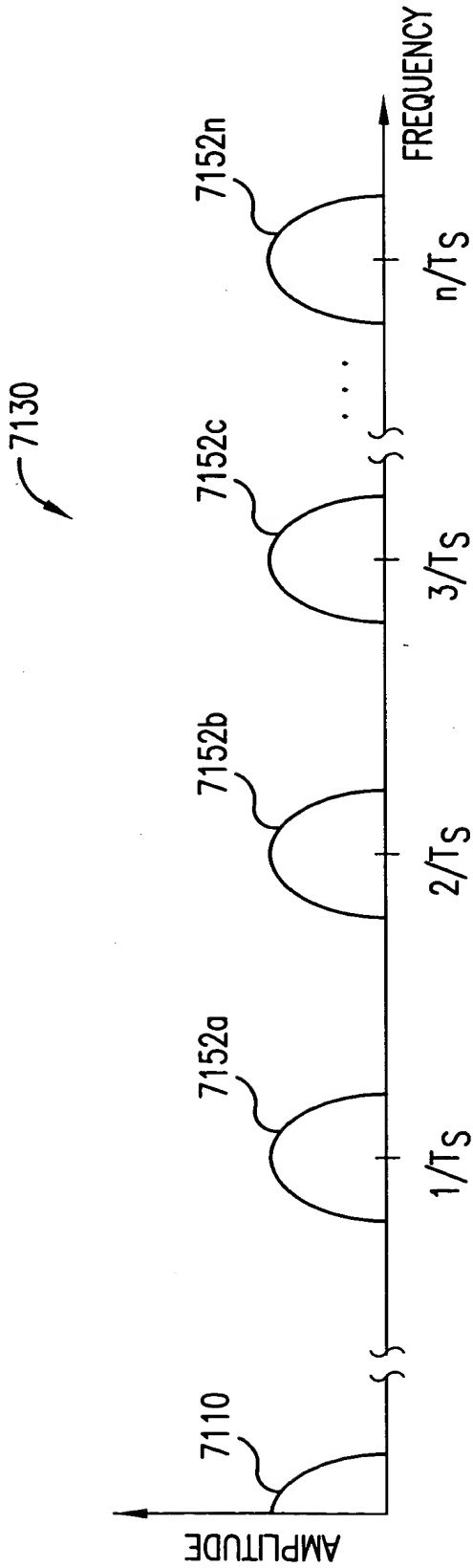


FIG. 711B

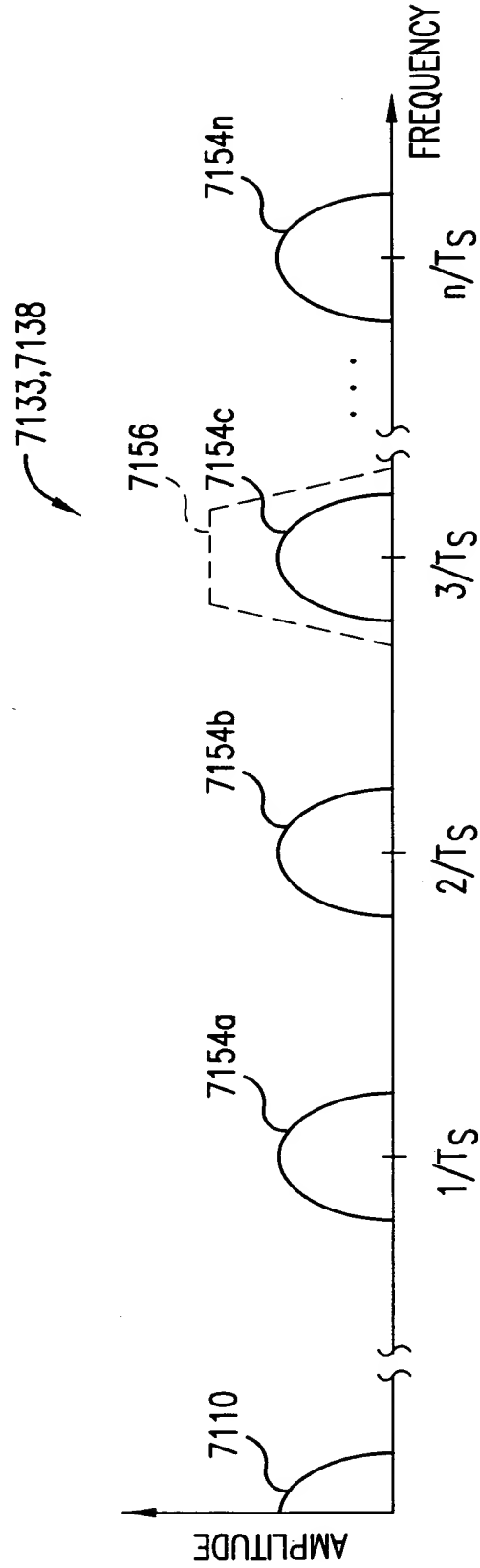


FIG. 711C

FIG. 71D

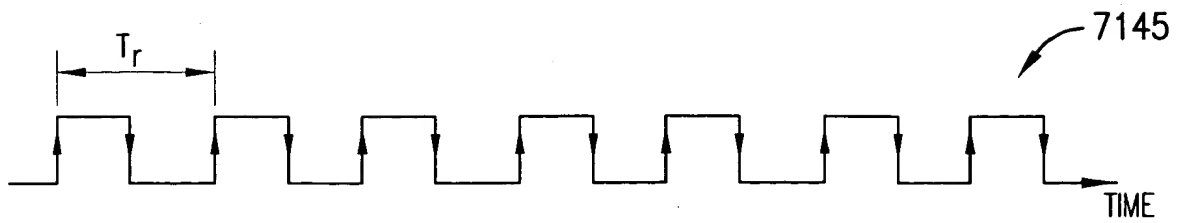


FIG.72A

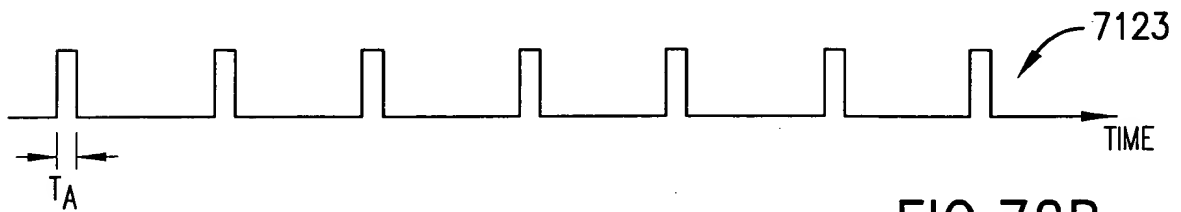


FIG.72B

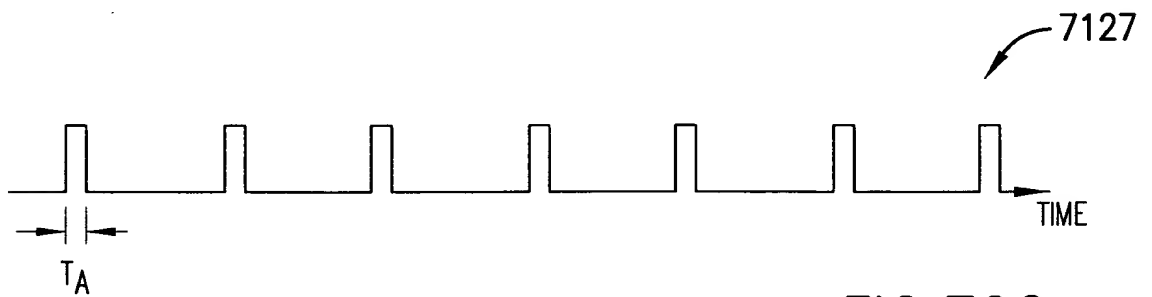


FIG.72C

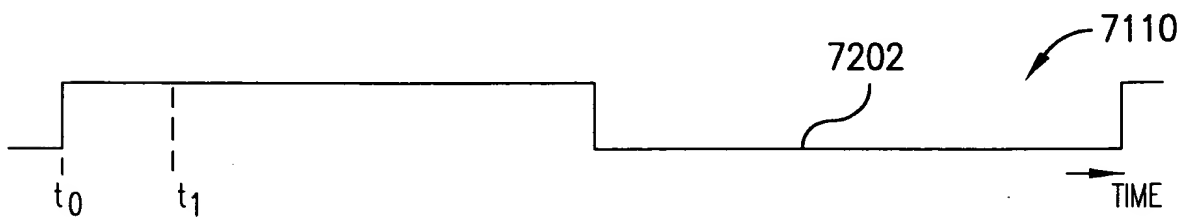


FIG.72D

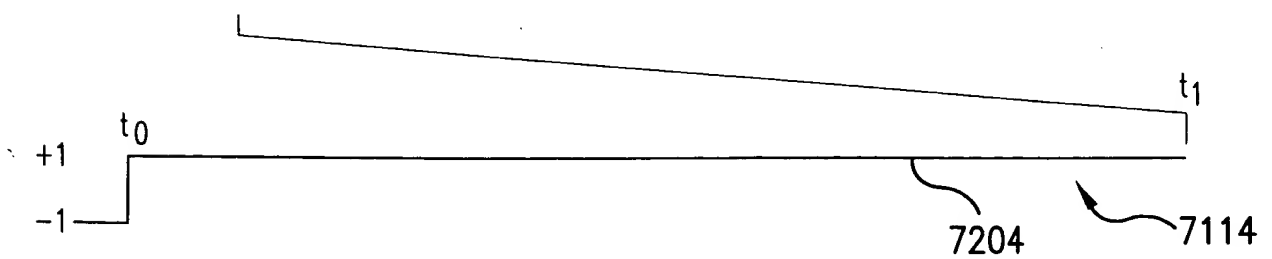


FIG.72E



FIG. 72F

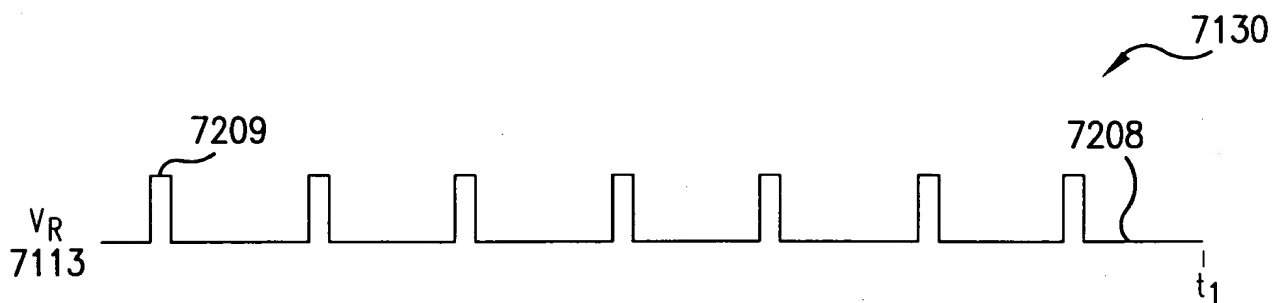


FIG. 72G

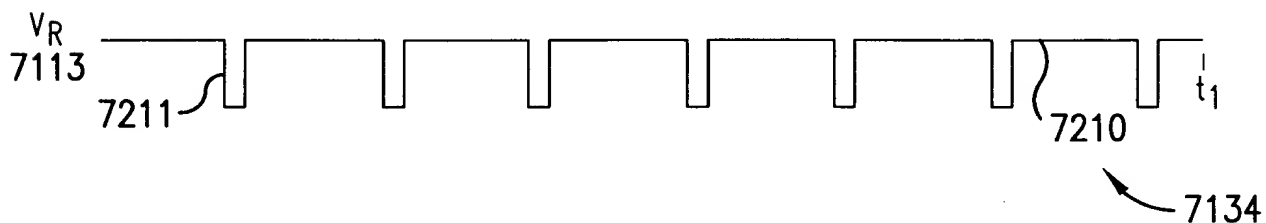


FIG. 72H

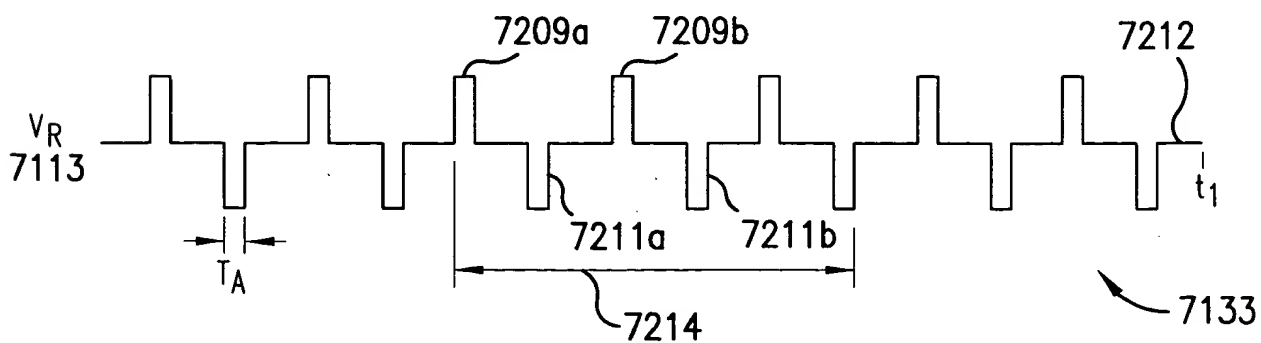


FIG. 72I



SQUARE WAVE FREQUENCY = 200Mhz

APERTURE = 500ps  
 FUNDAMENTAL CLOCK = 200Mhz (5<sup>th</sup> SUBHARMONIC)

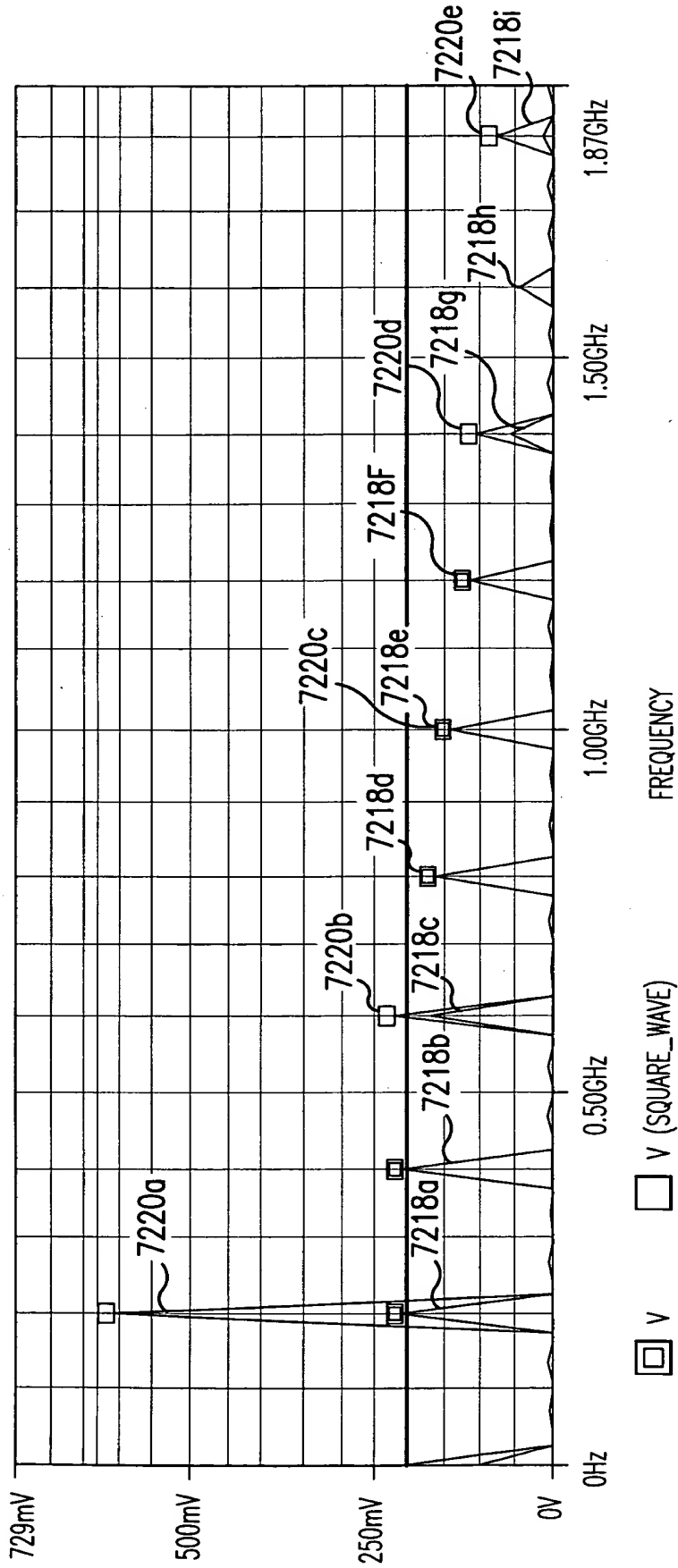


FIG.72J

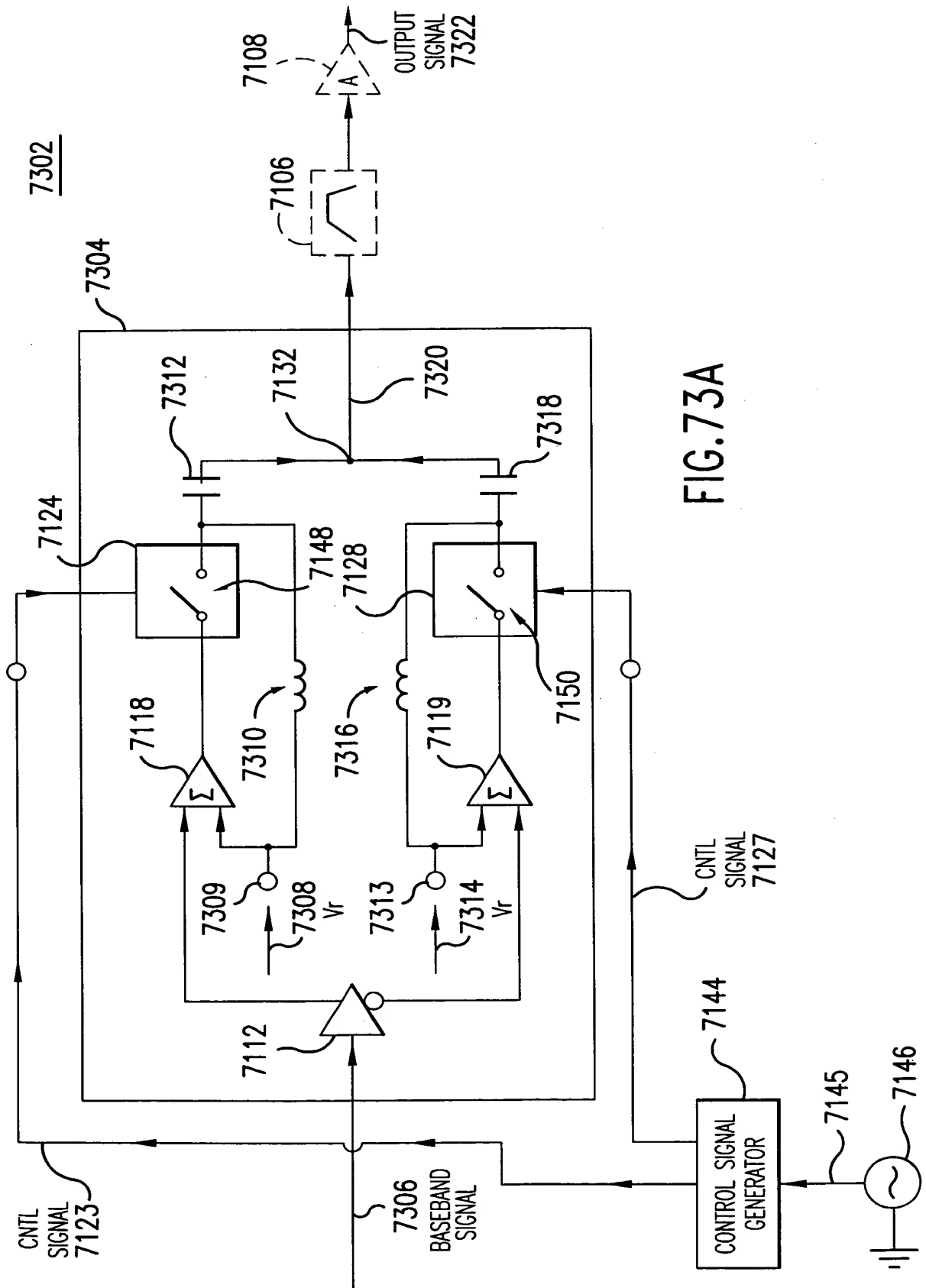
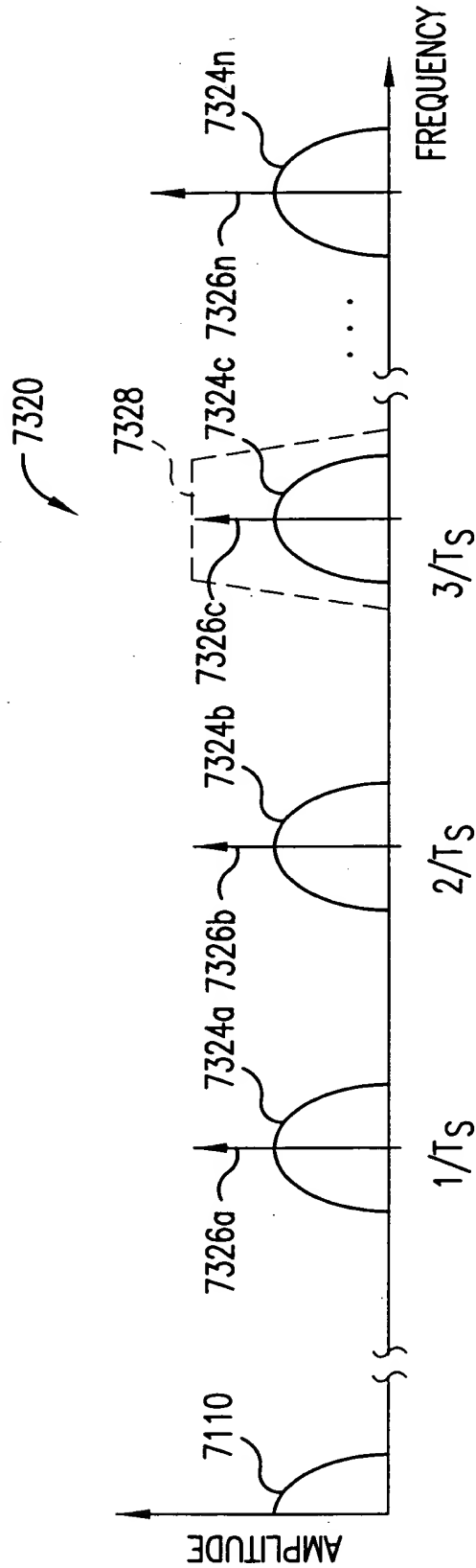


FIG. 730A



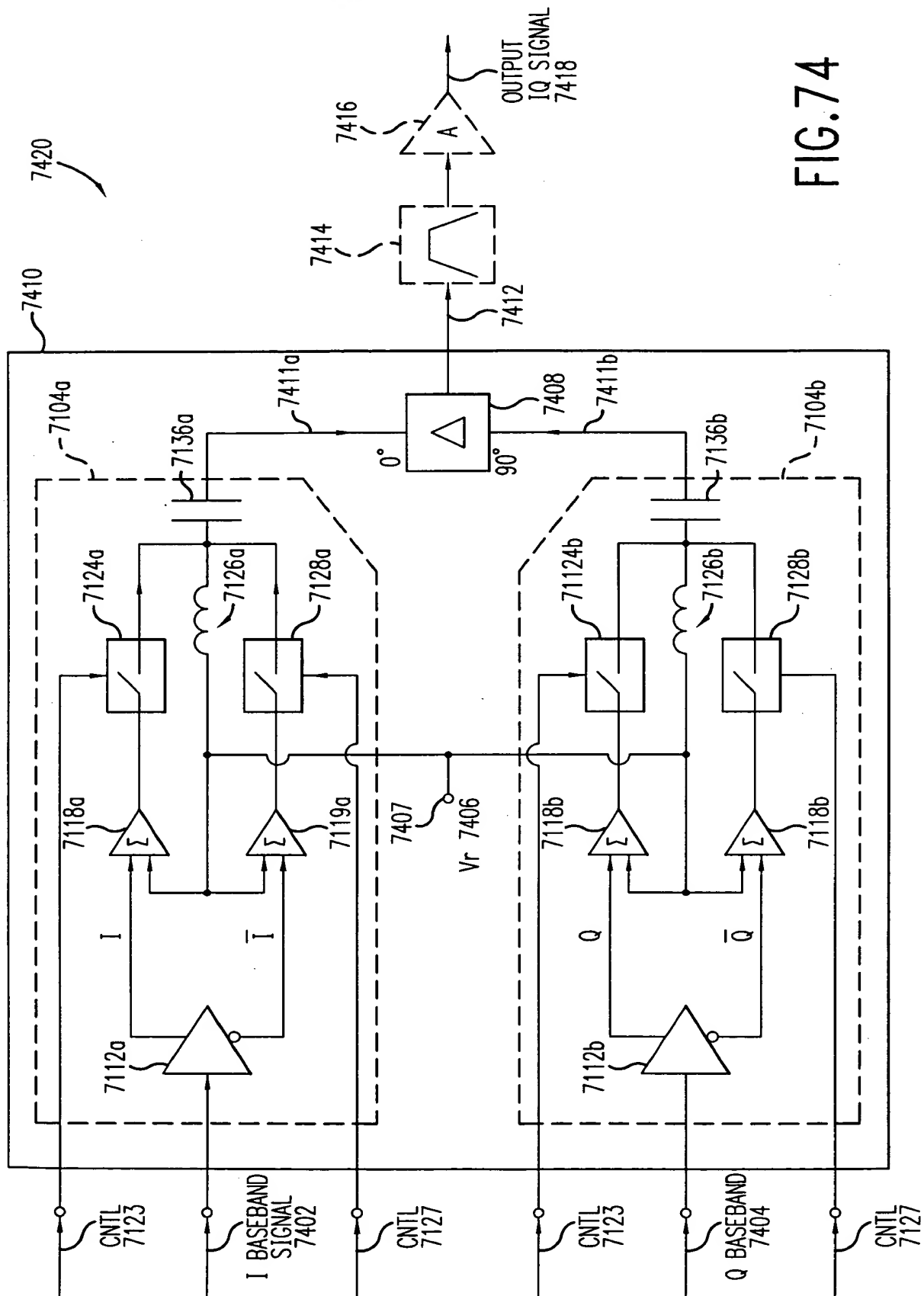
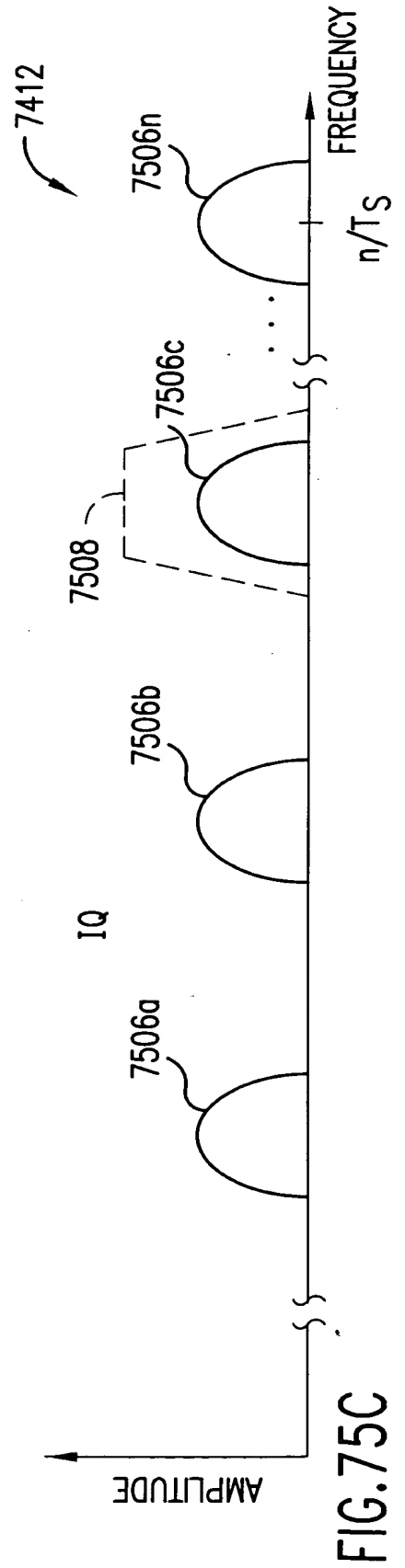
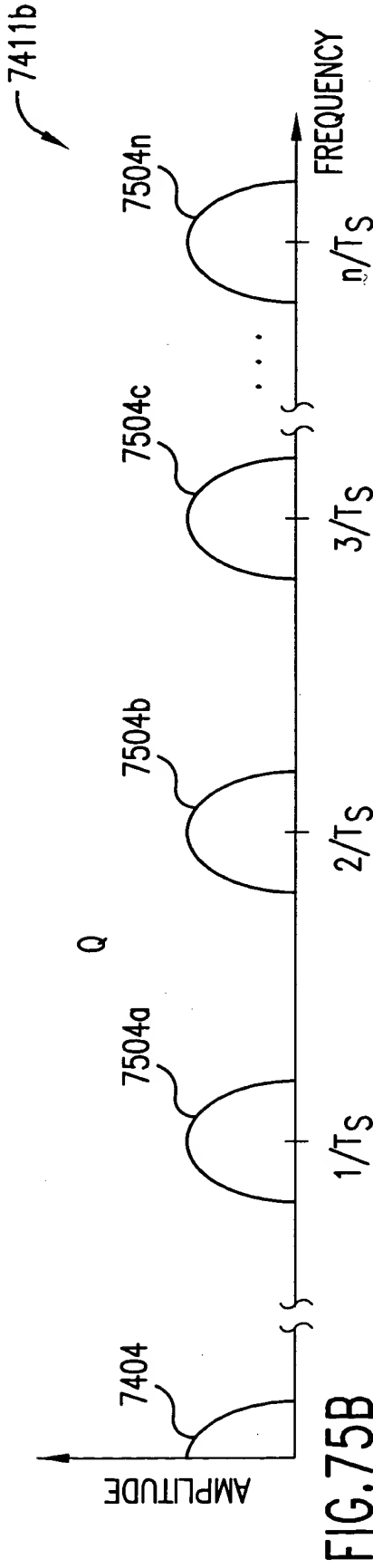
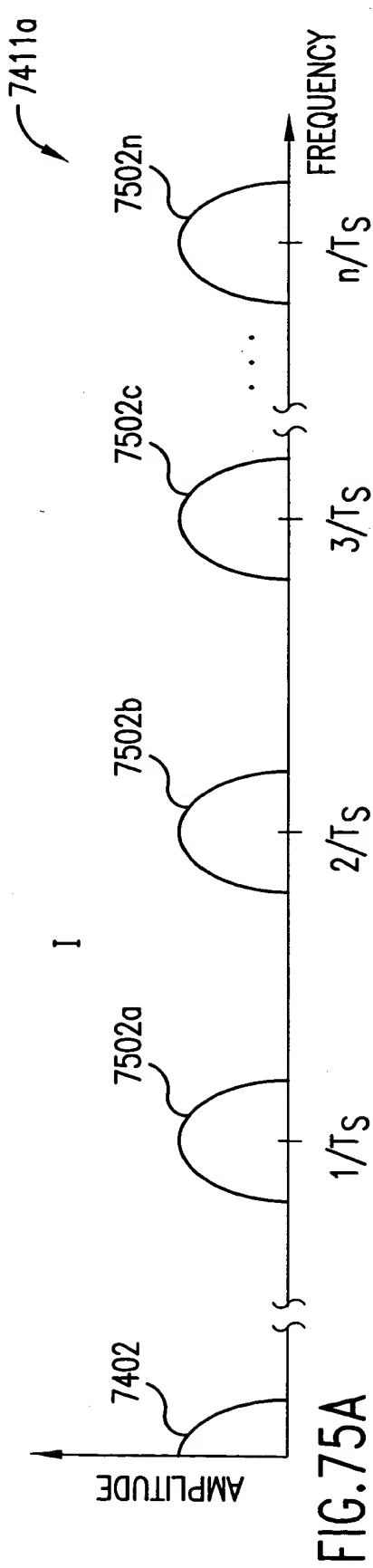
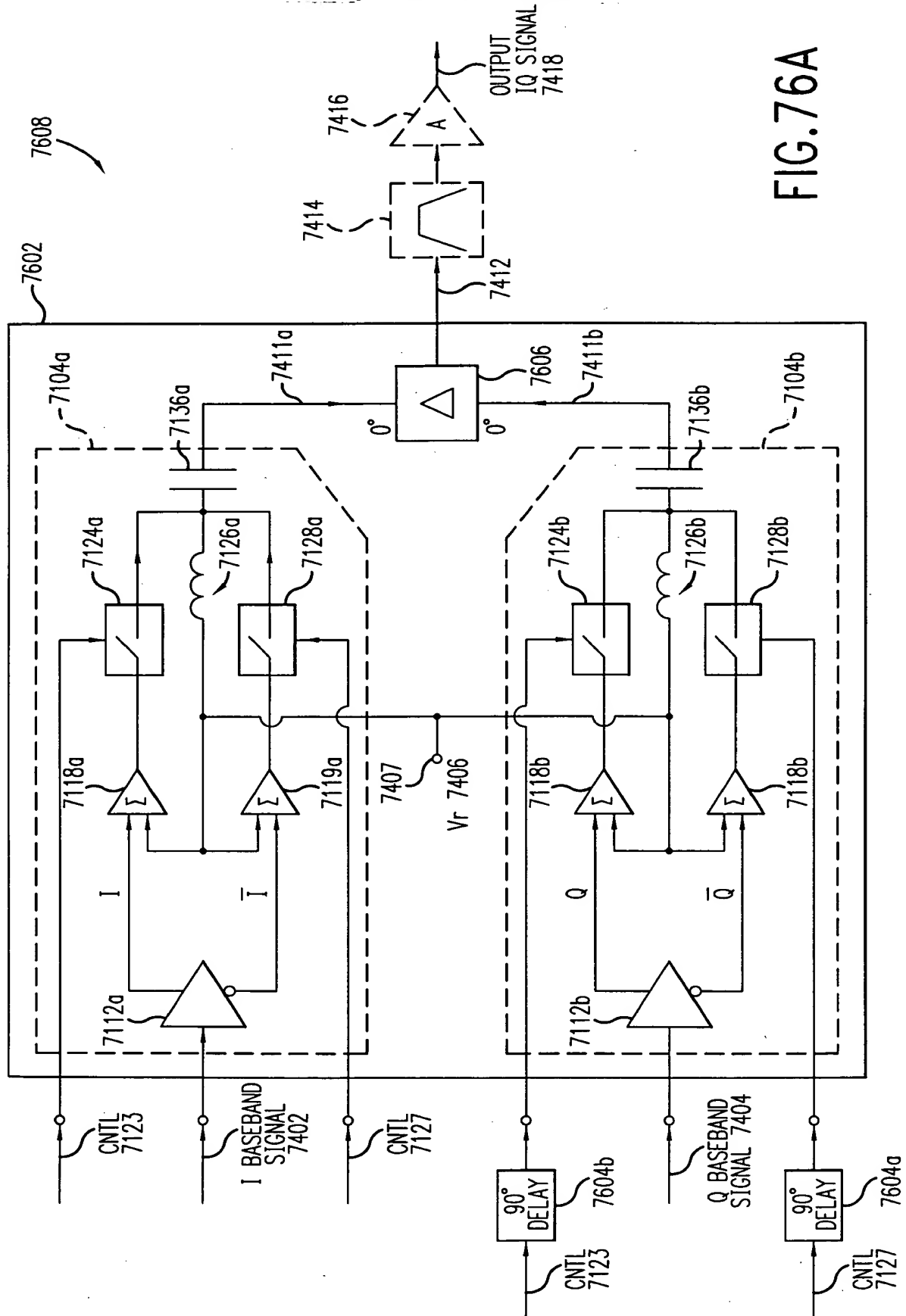


FIG.74





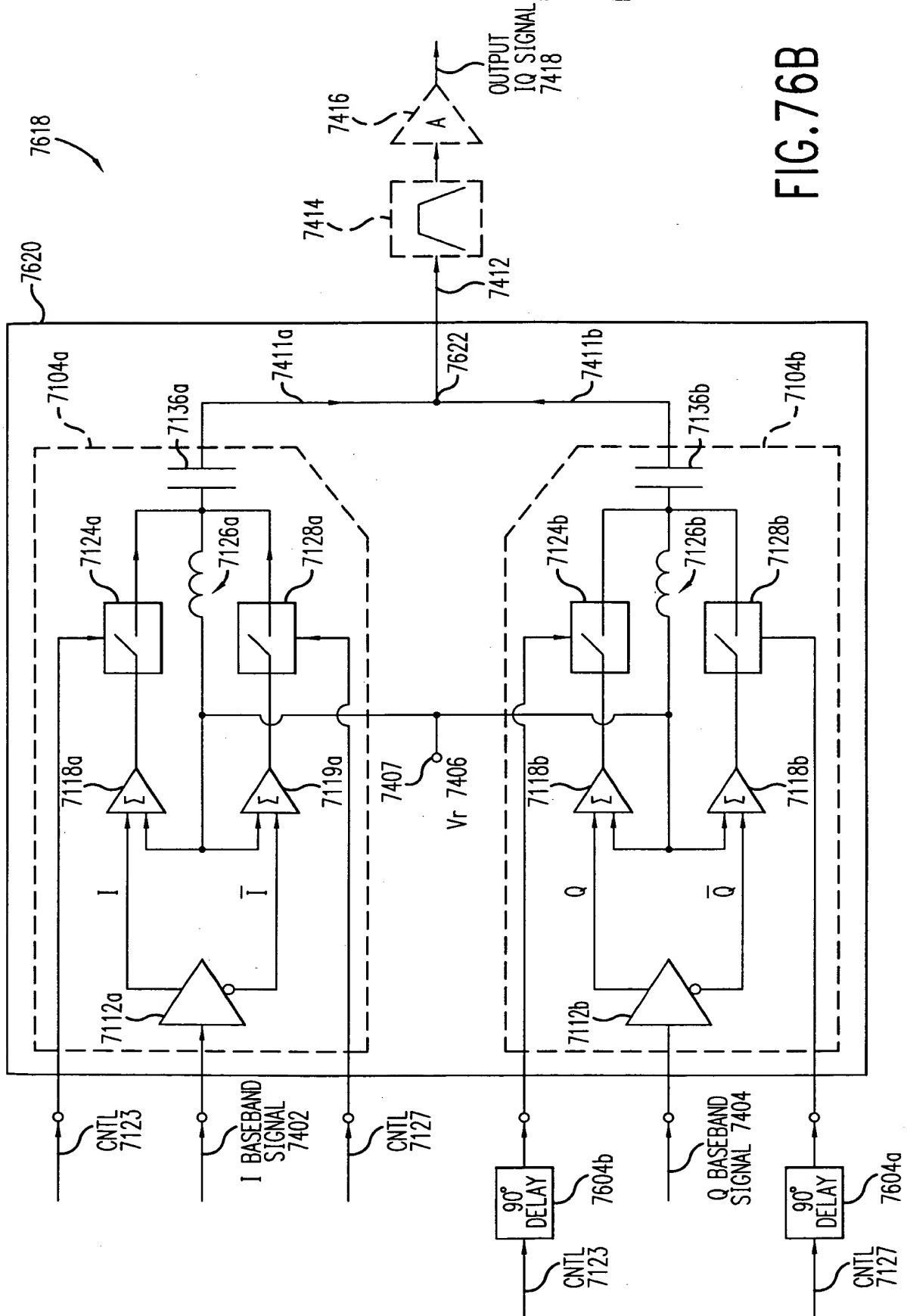


FIG. 76B

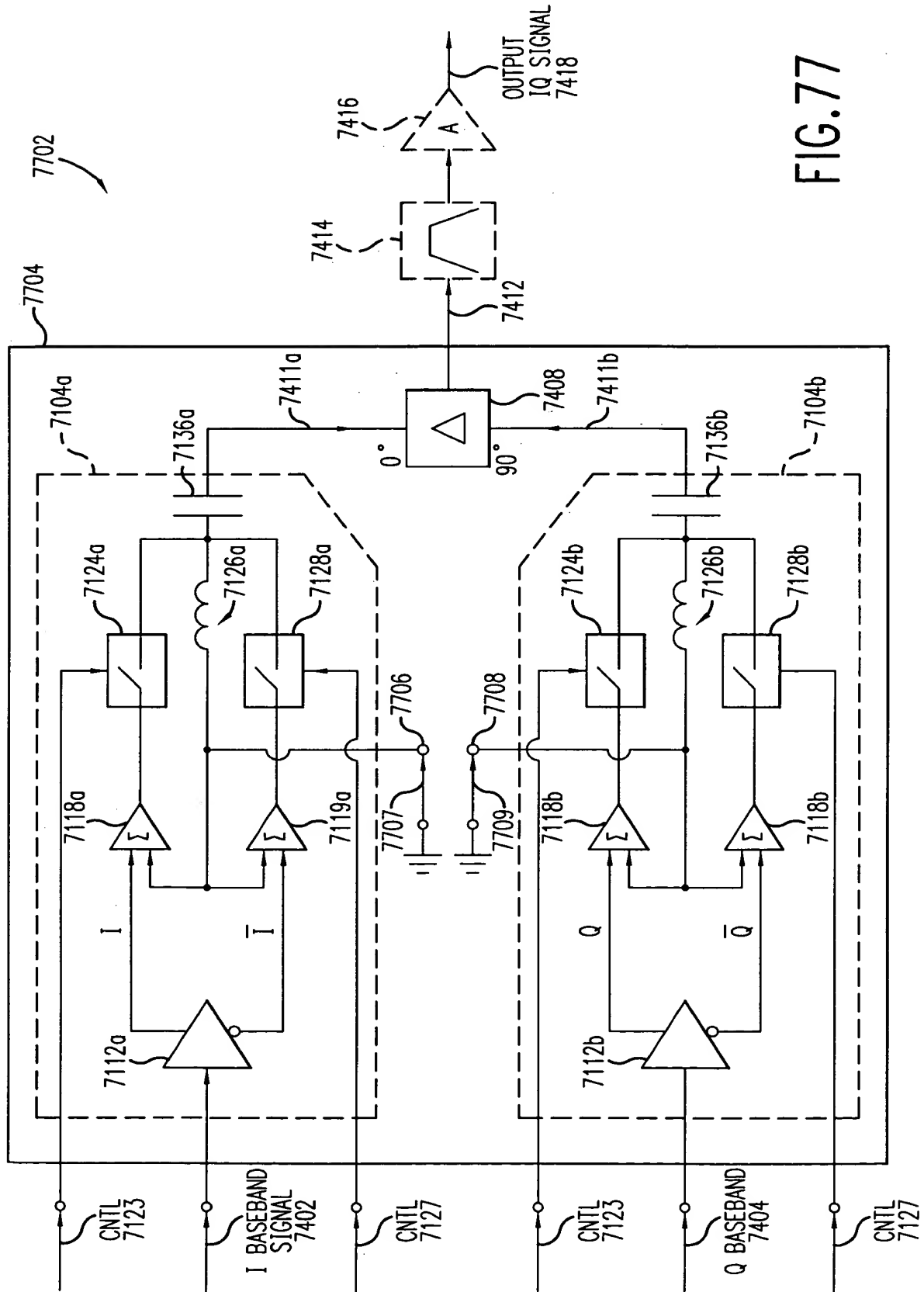


FIG. 77



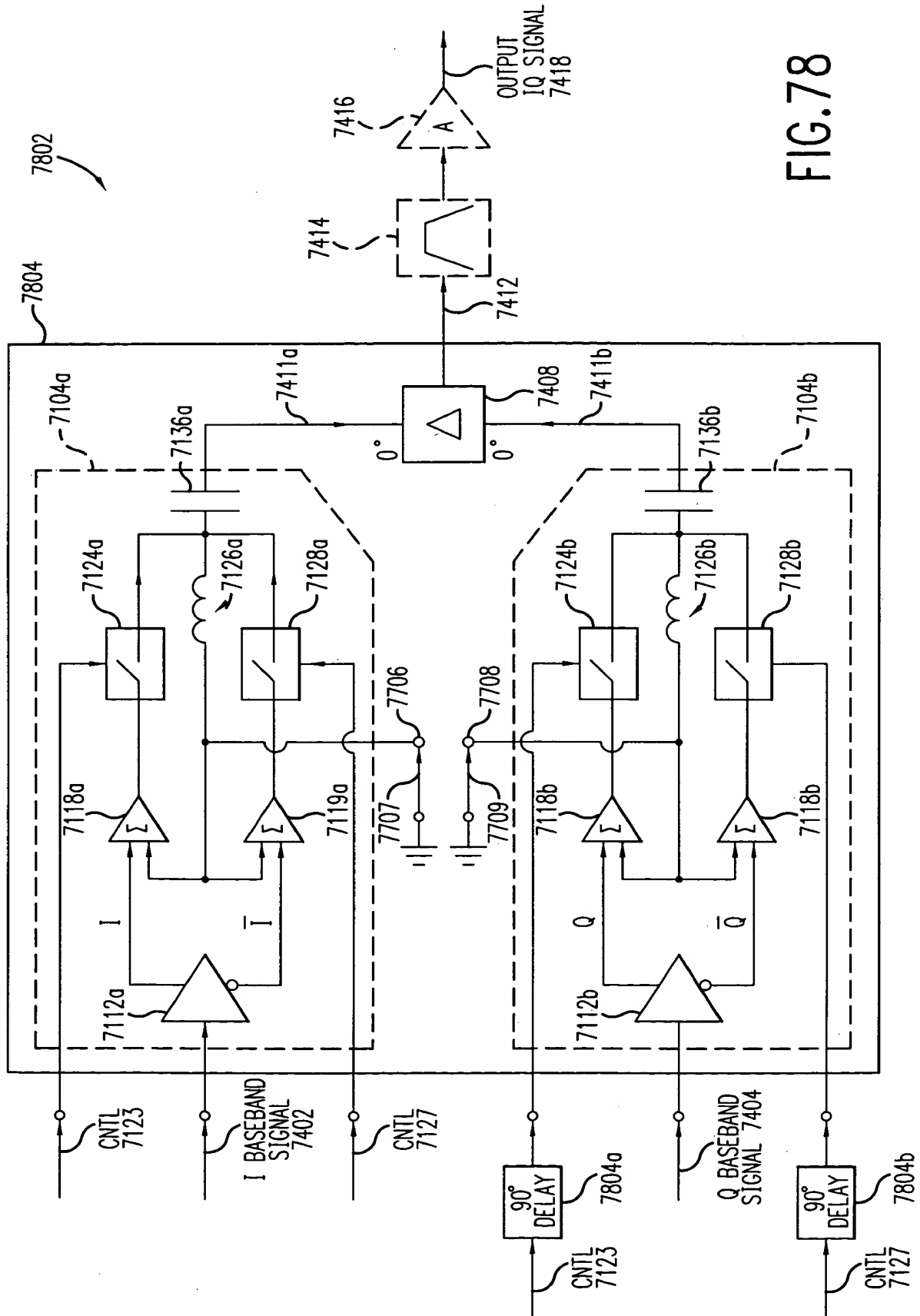
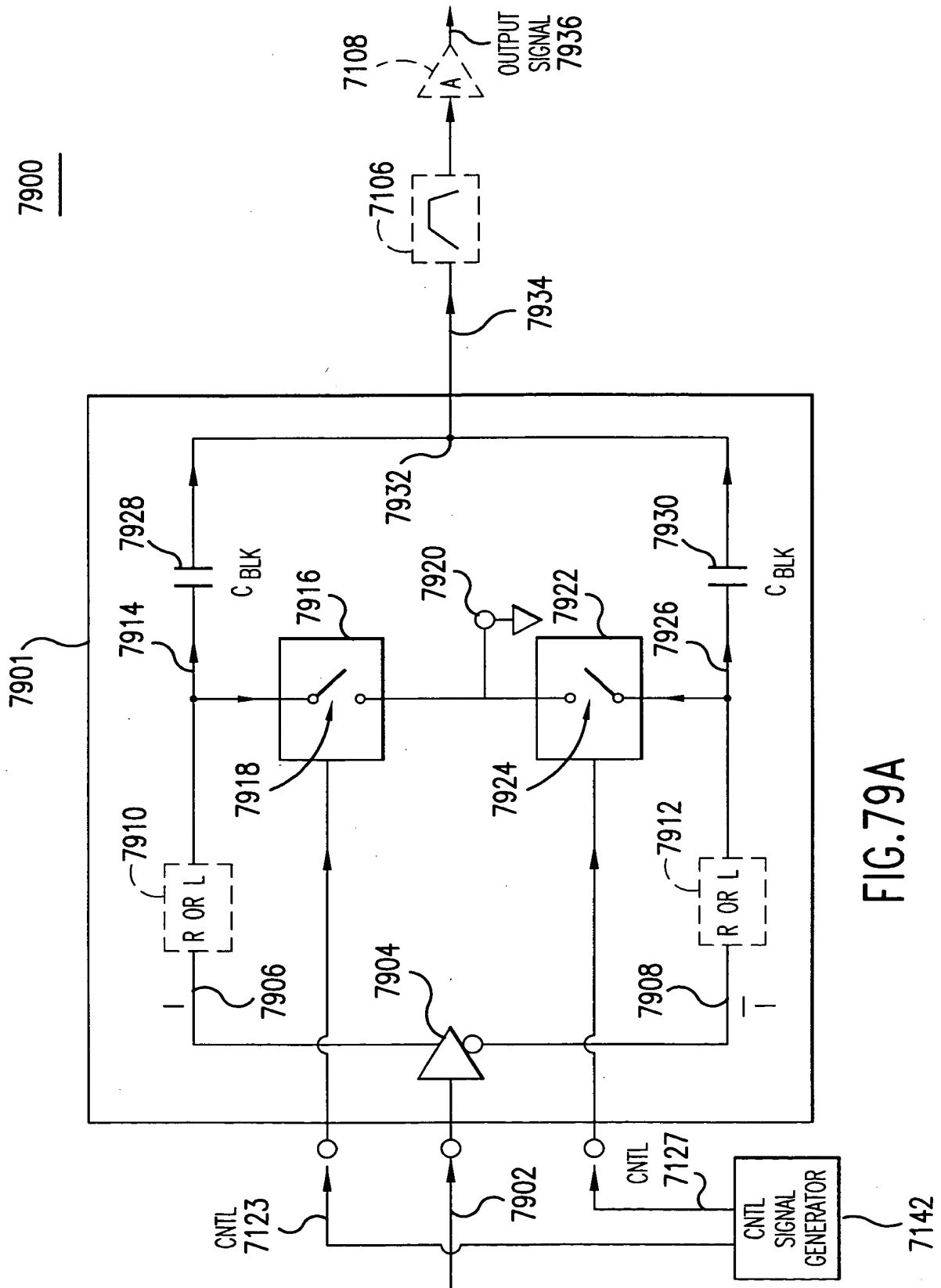


FIG. 78



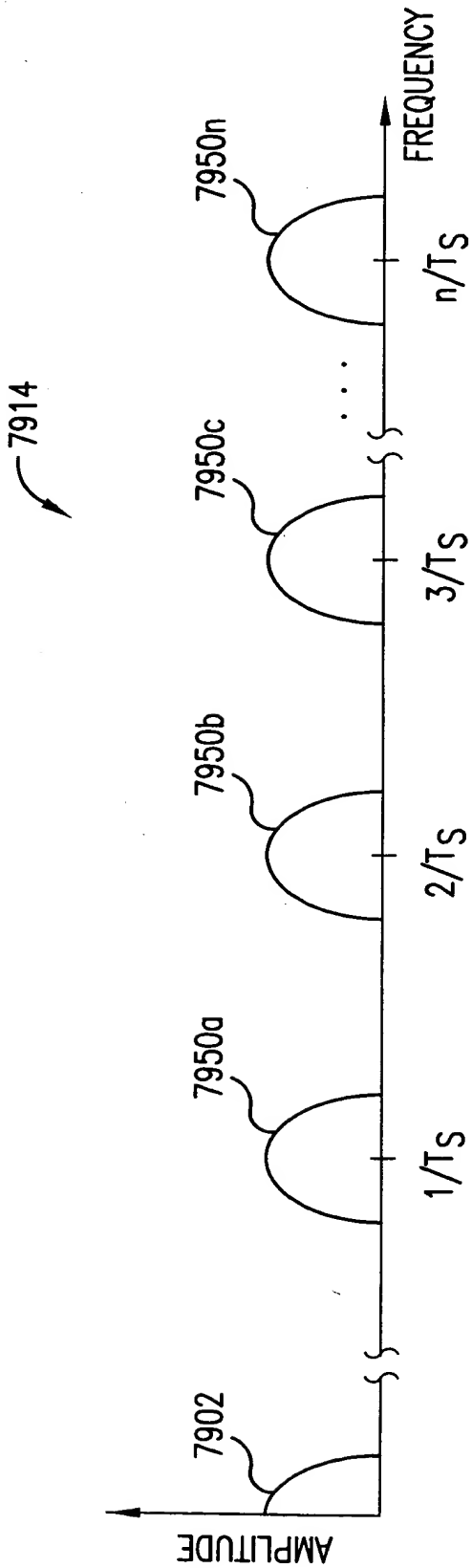


FIG. 79B

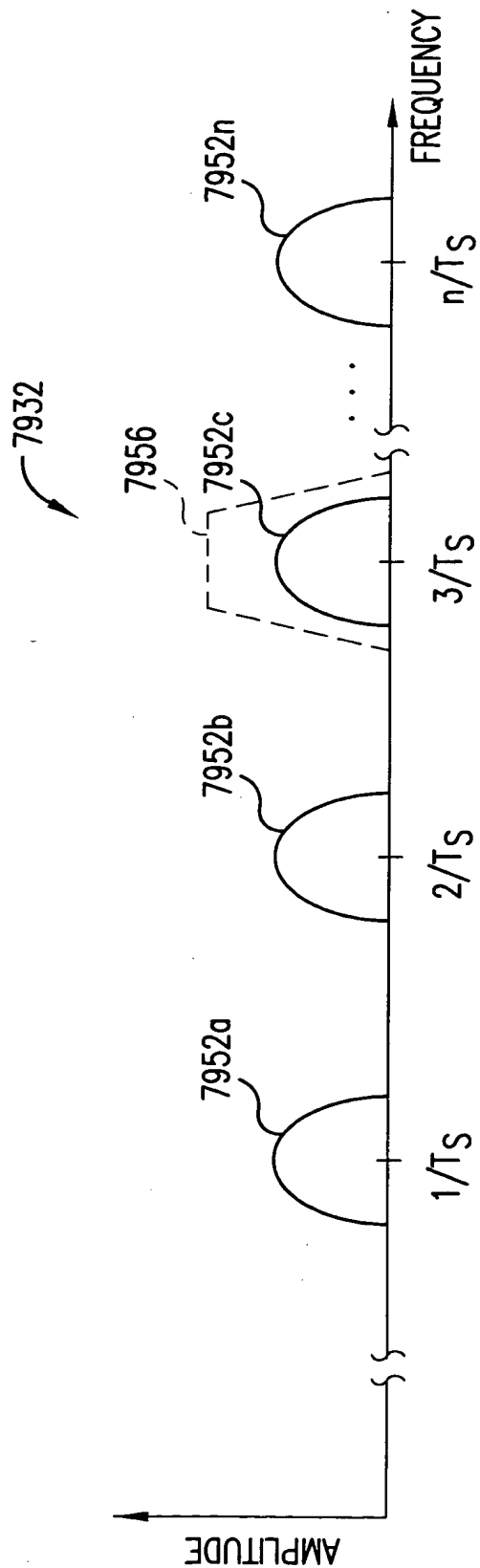
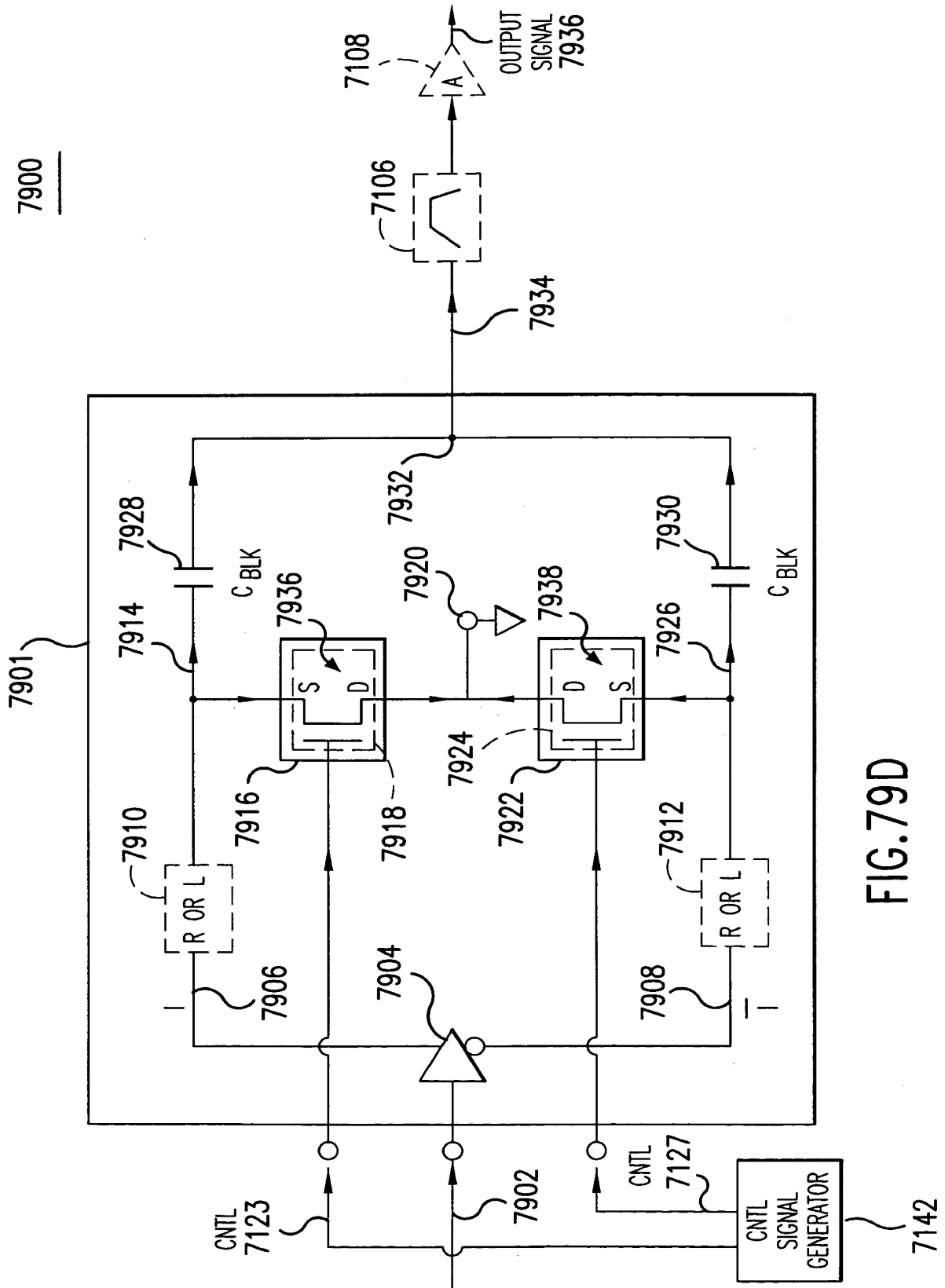


FIG. 79C



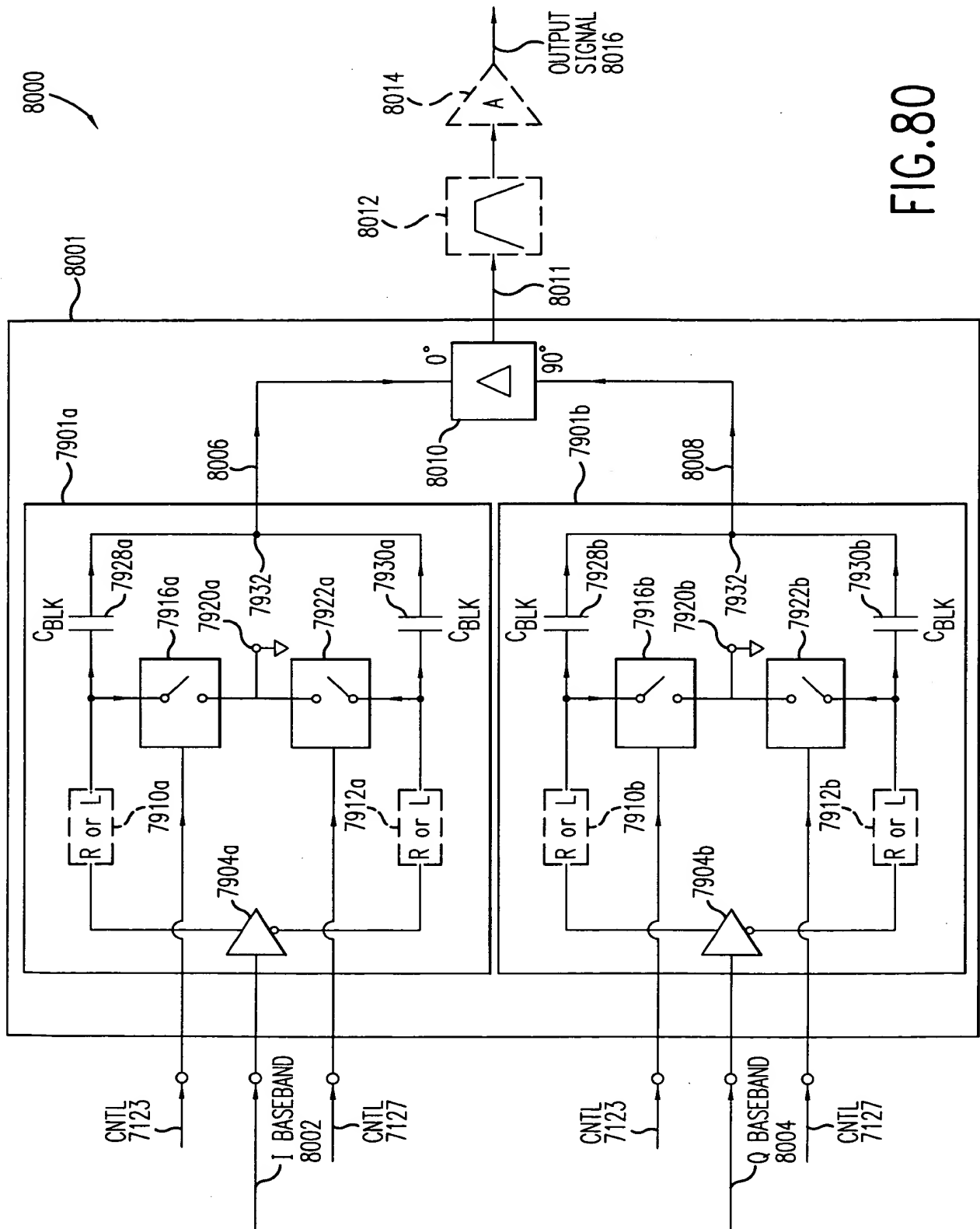
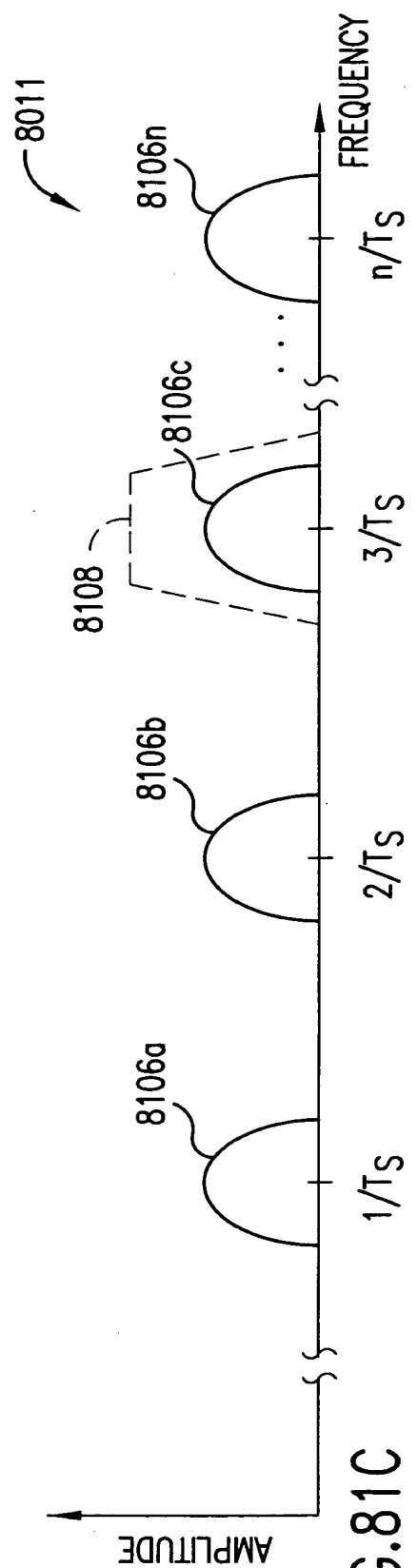
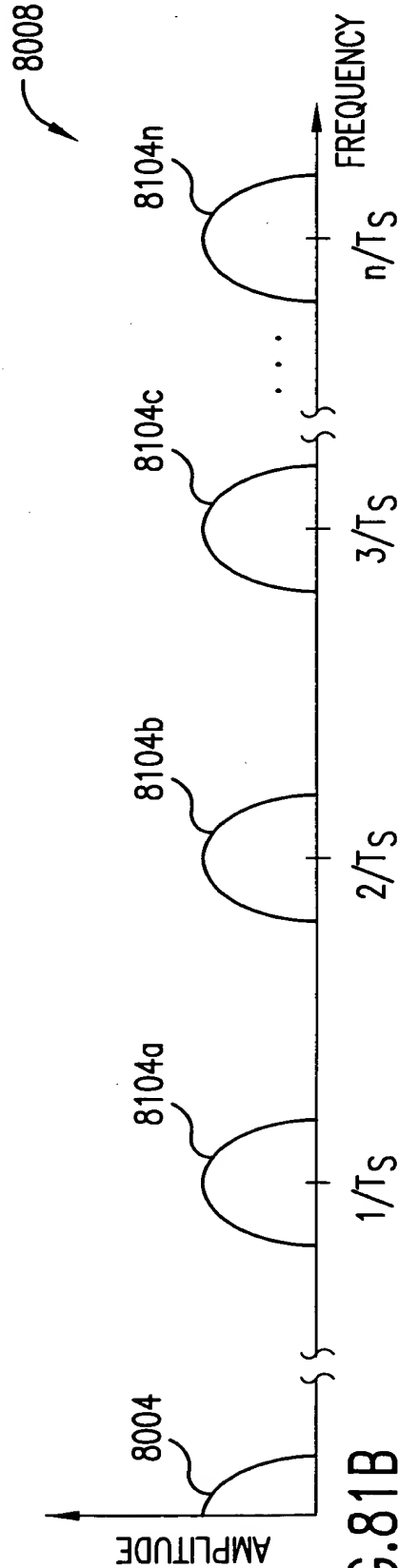
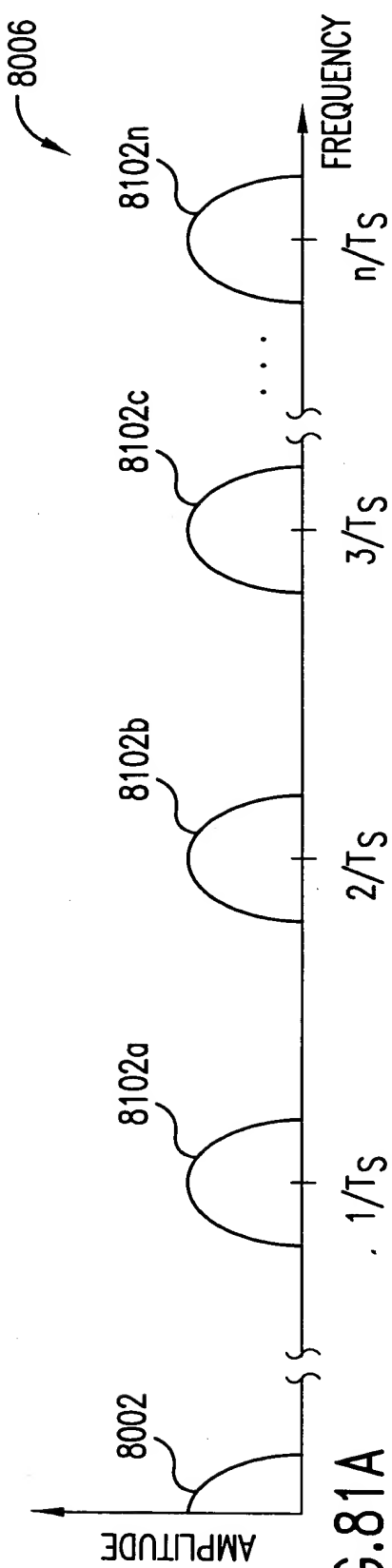


FIG. 80



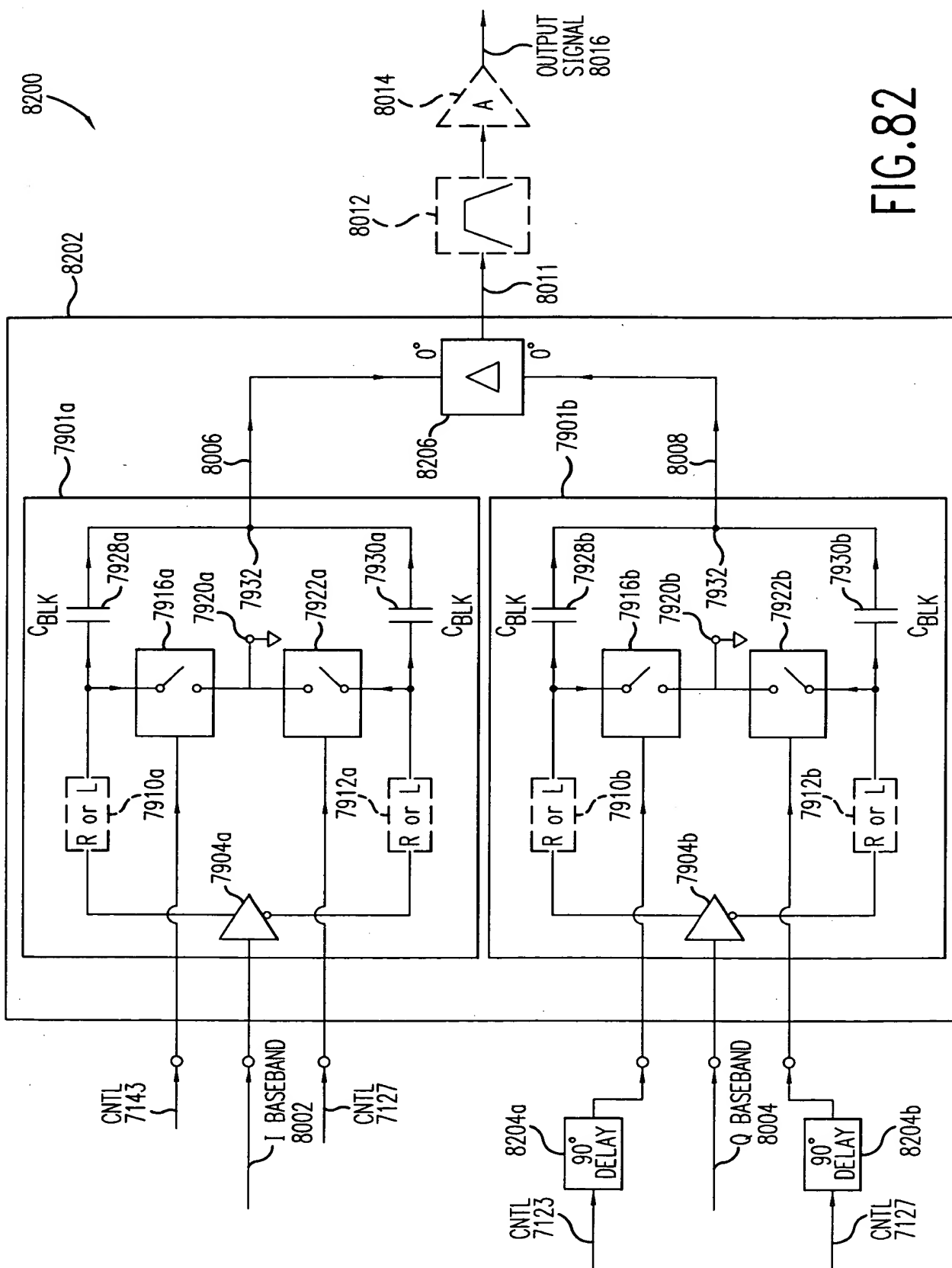


FIG. 82

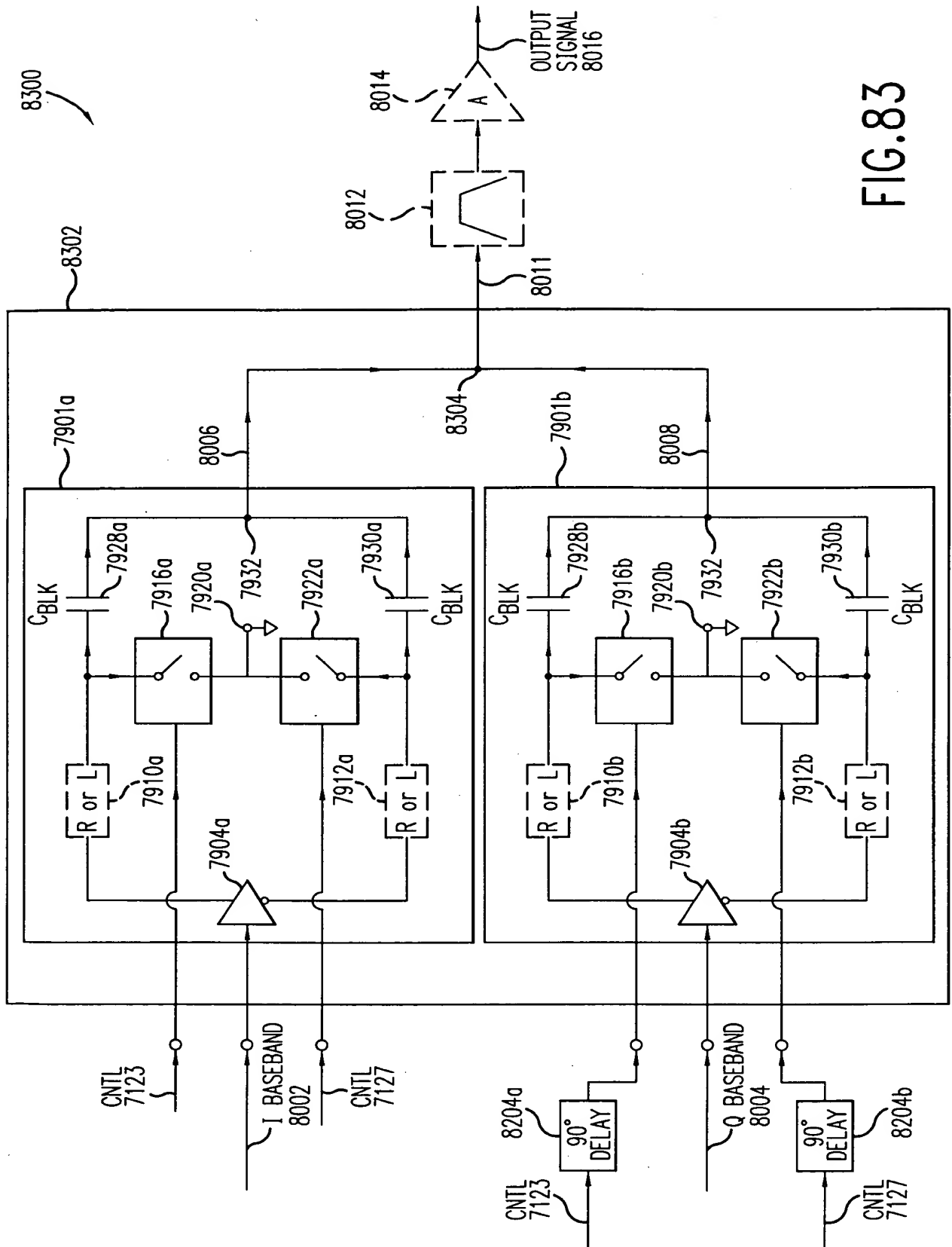


FIG. 83



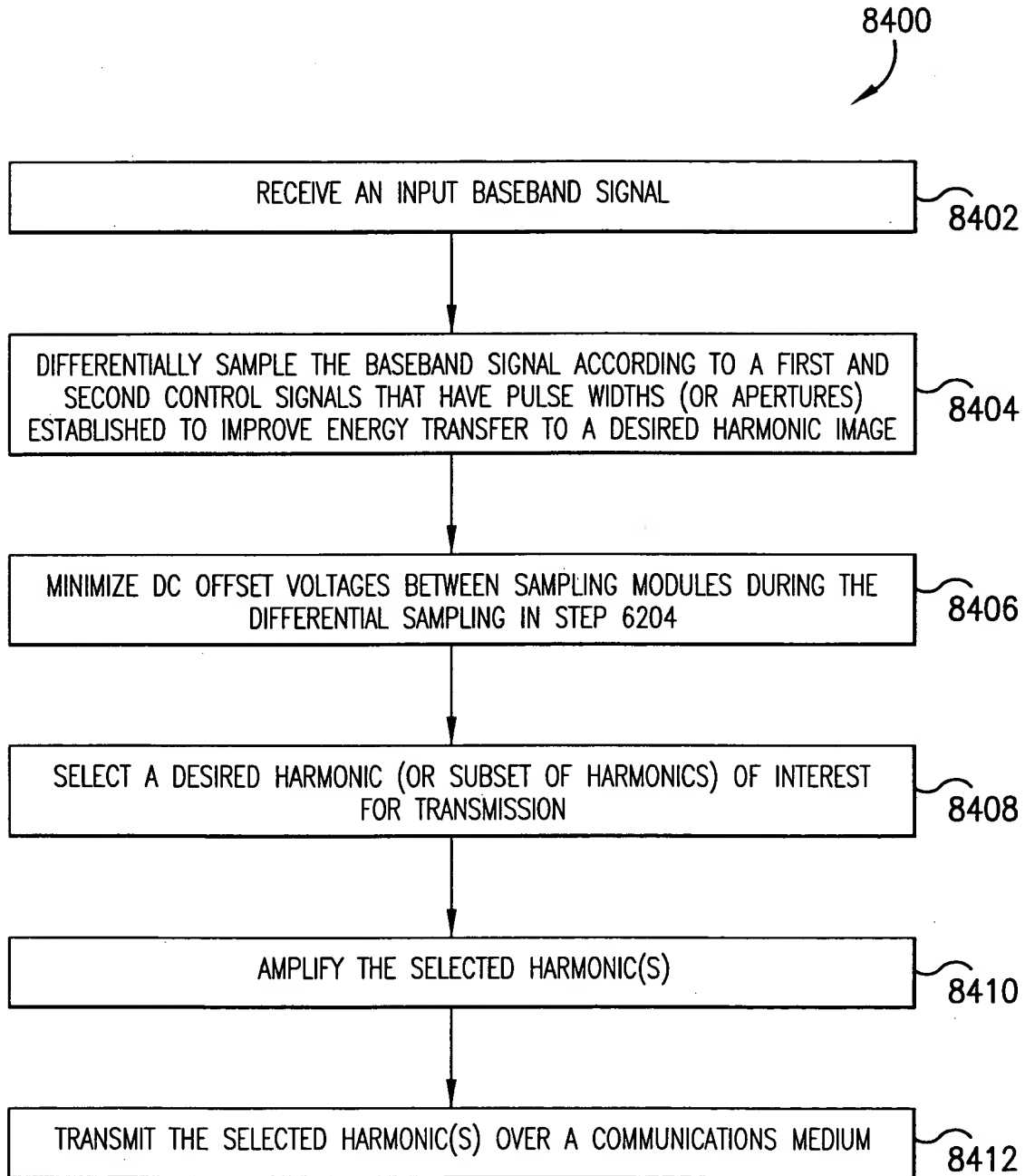


FIG.84

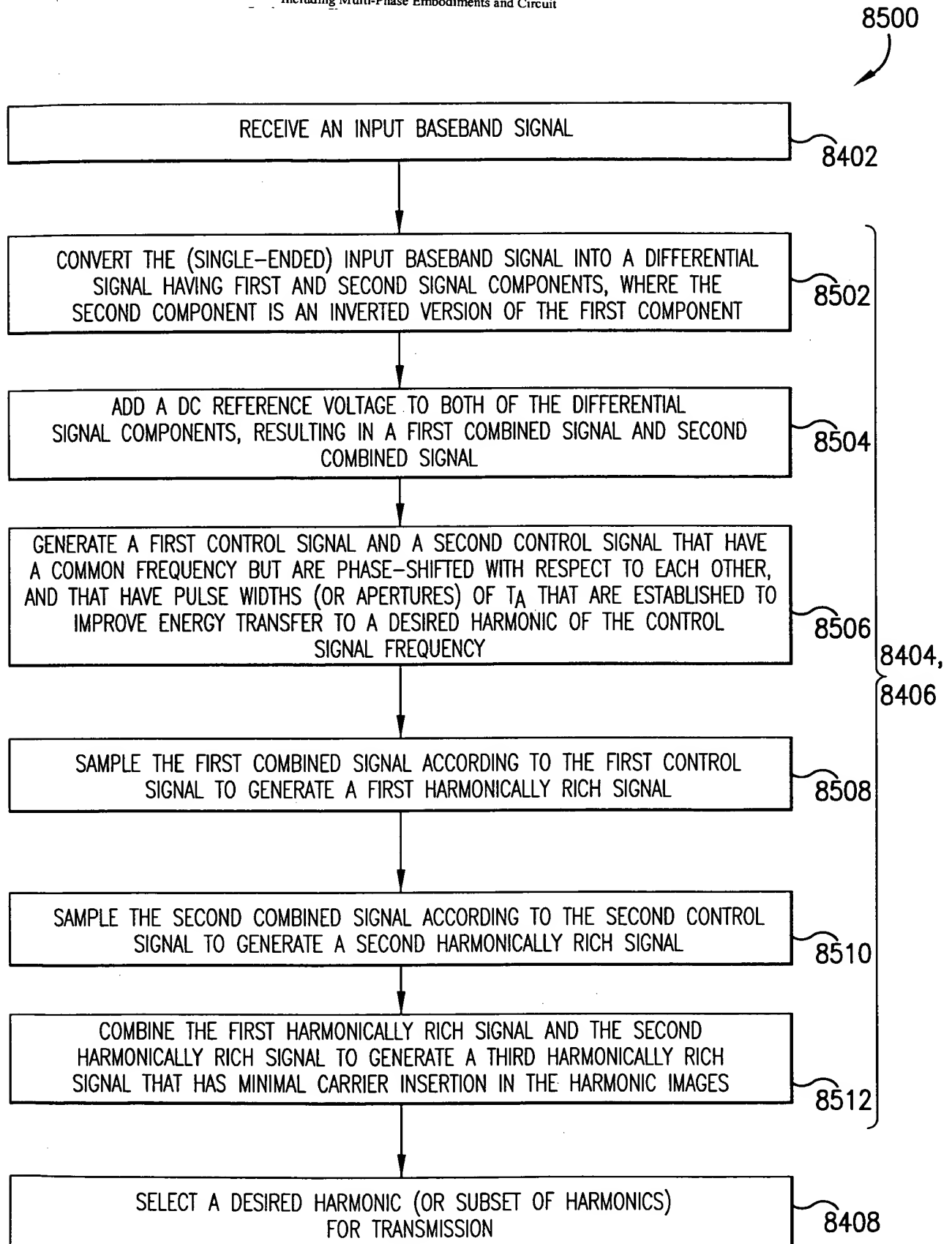


FIG.85

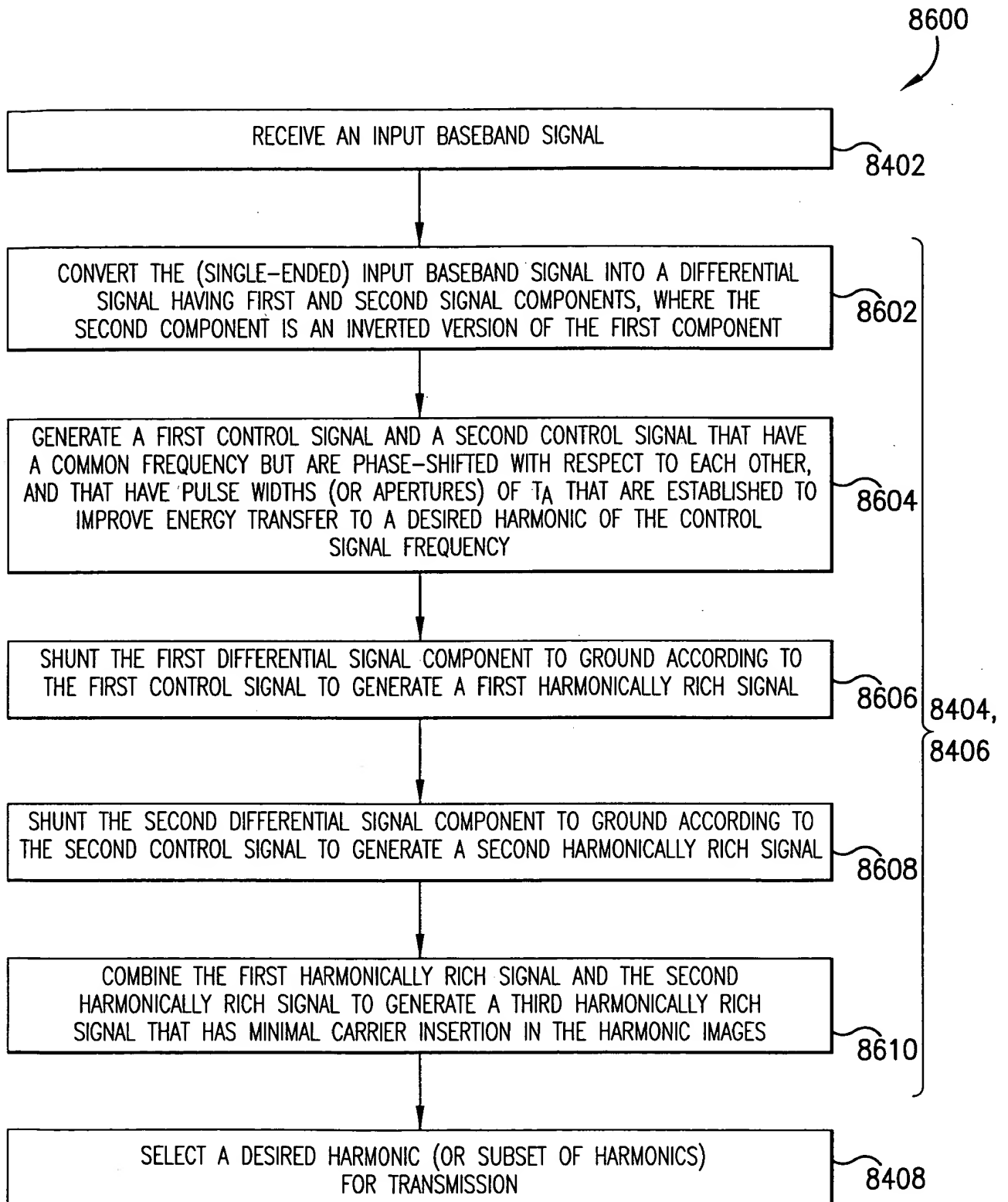


FIG.86

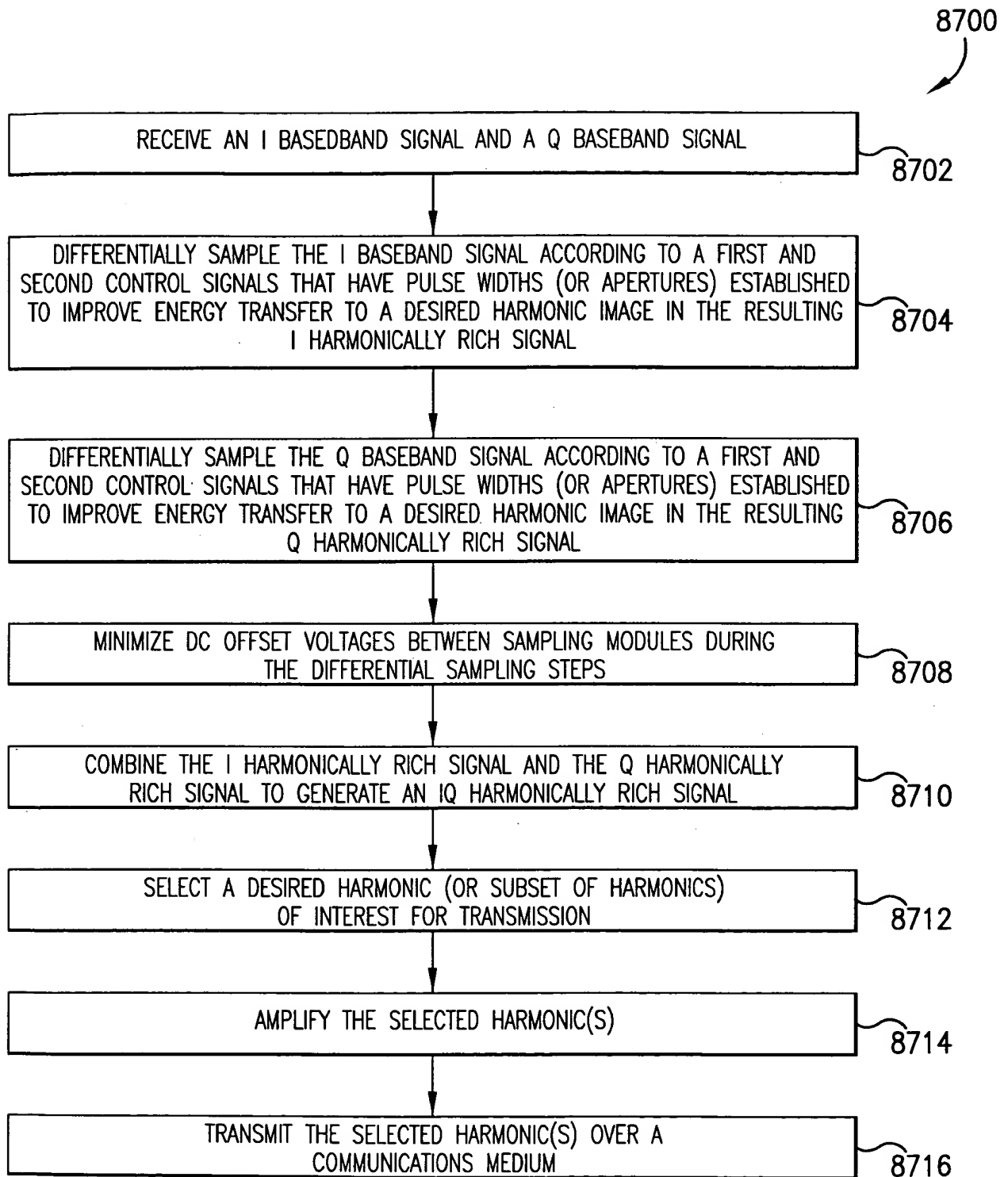


FIG.87

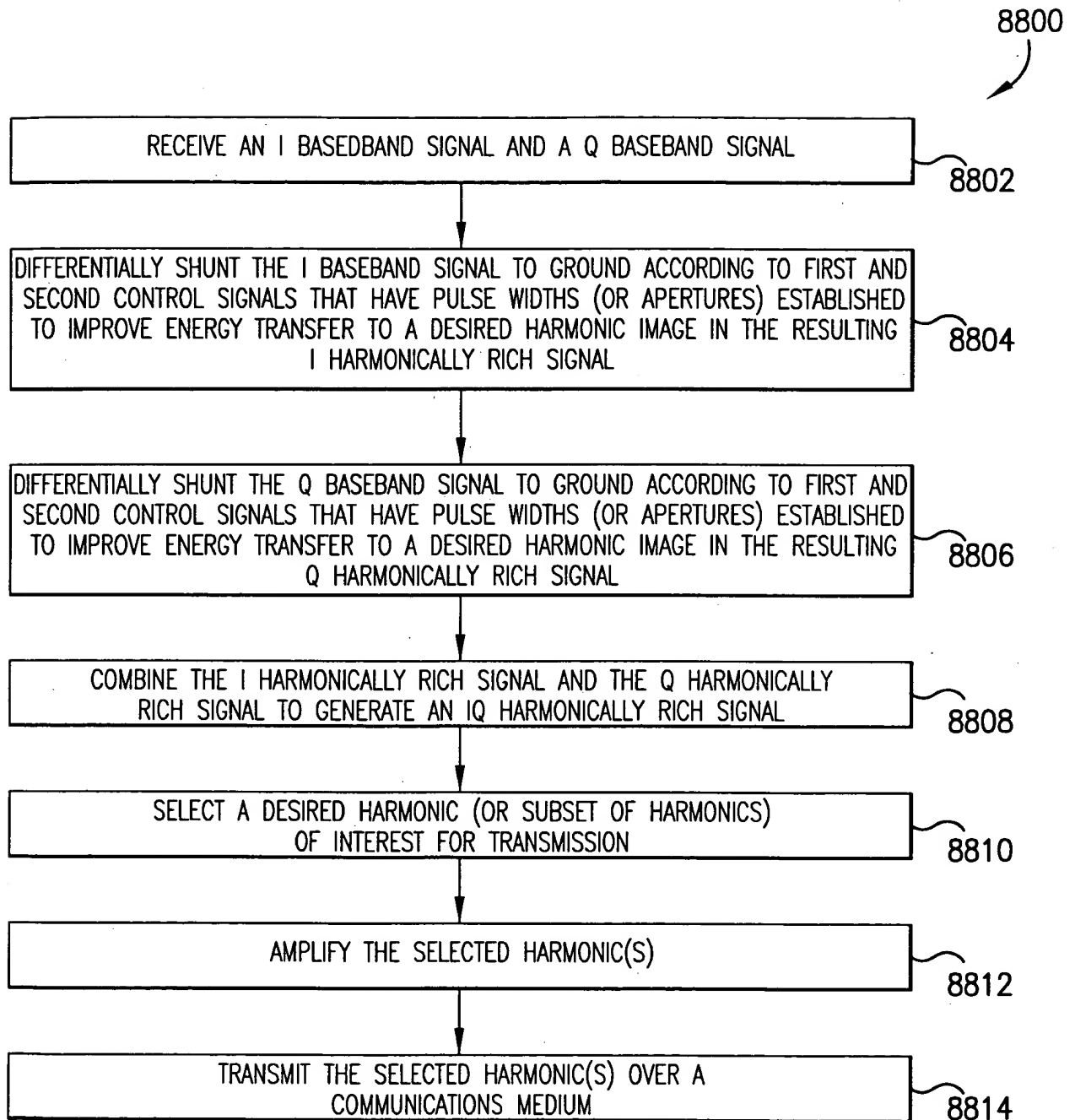
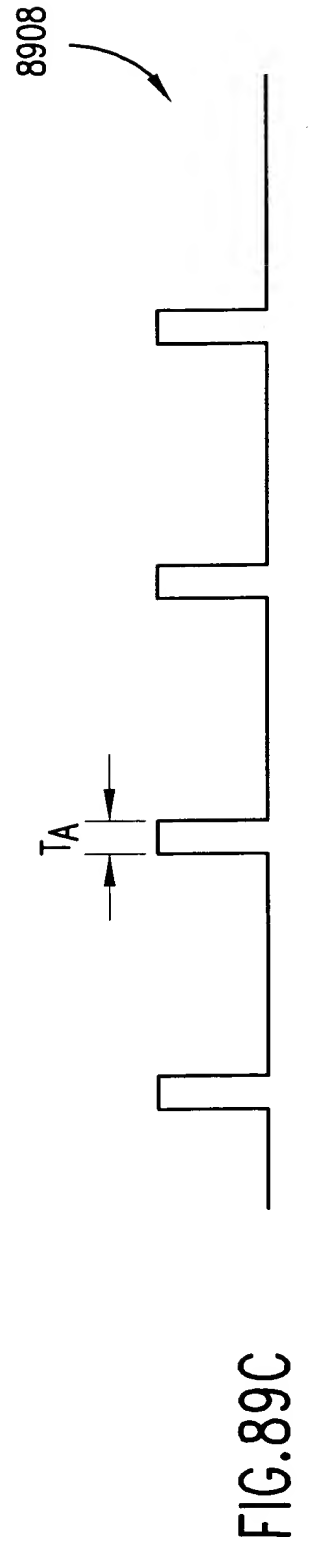
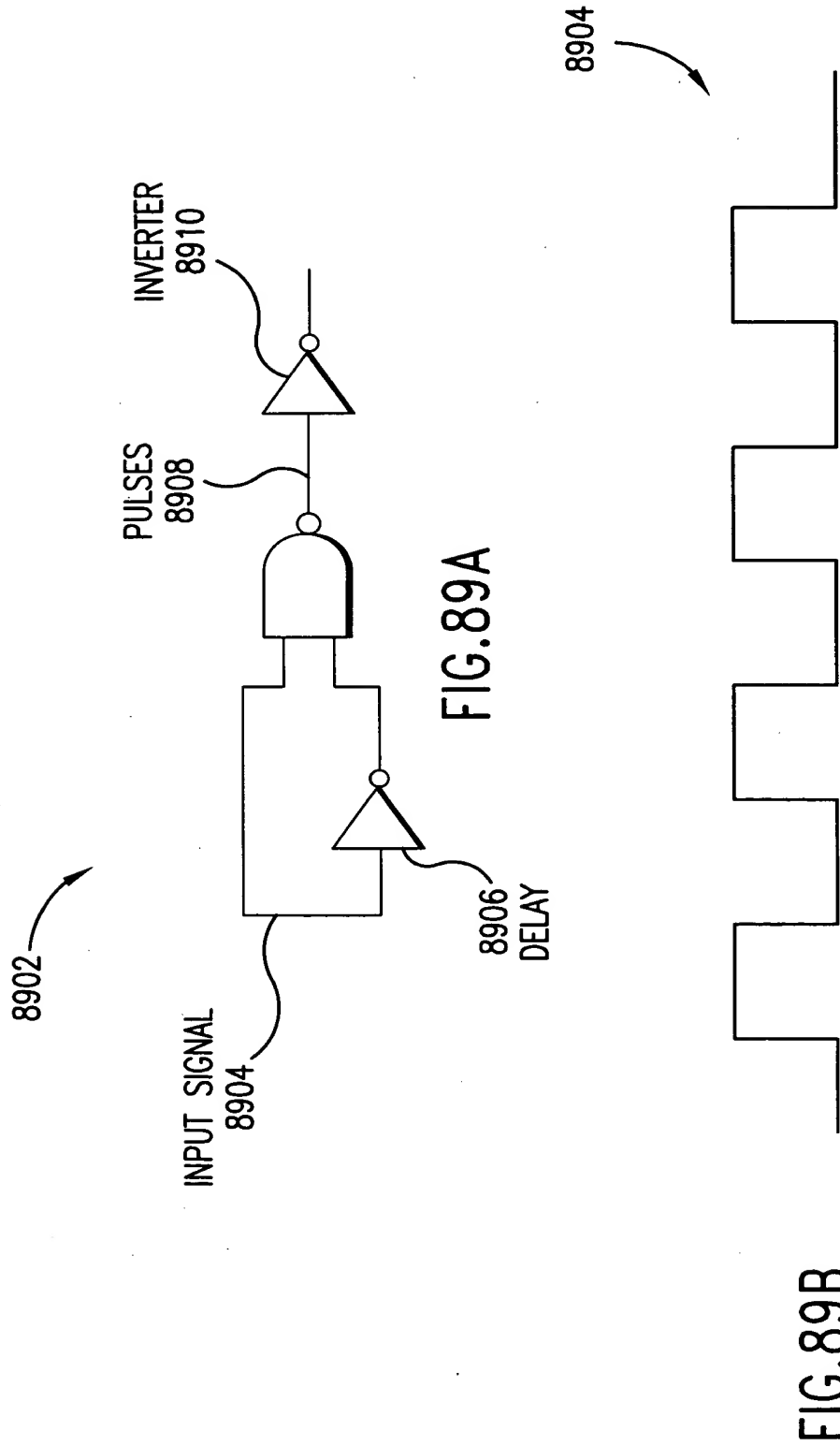


FIG.88



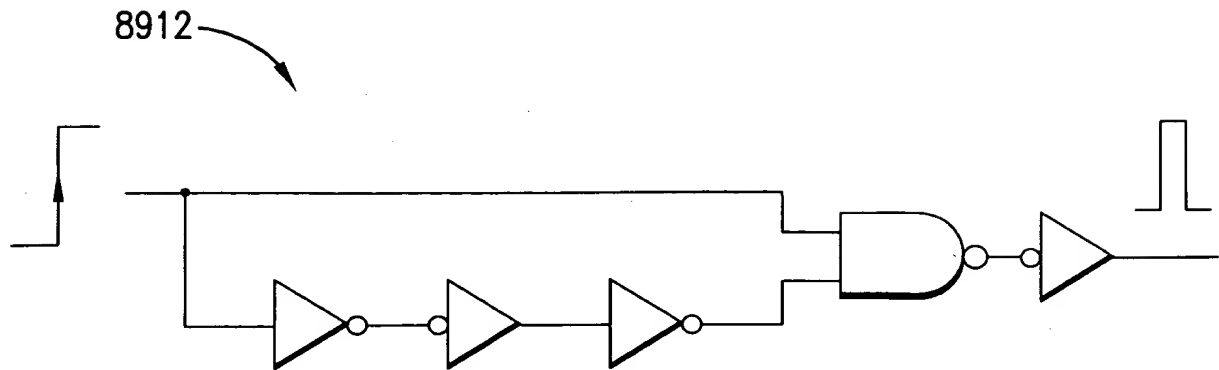


FIG.89D

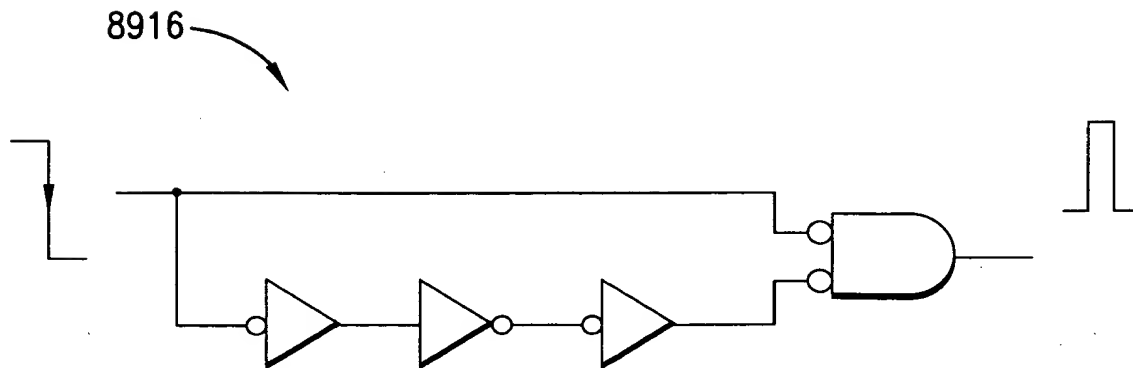


FIG.89E

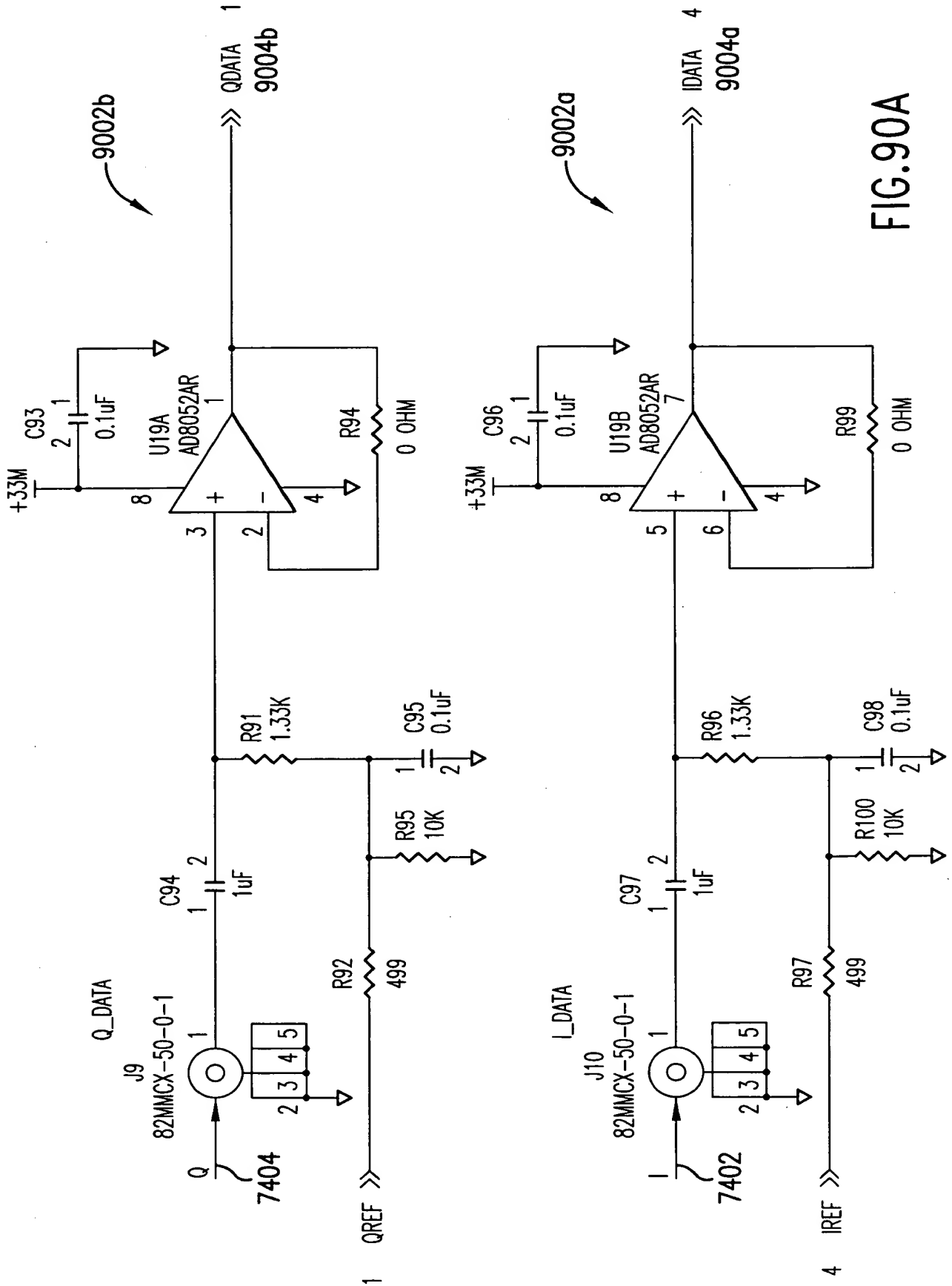


FIG. 90A



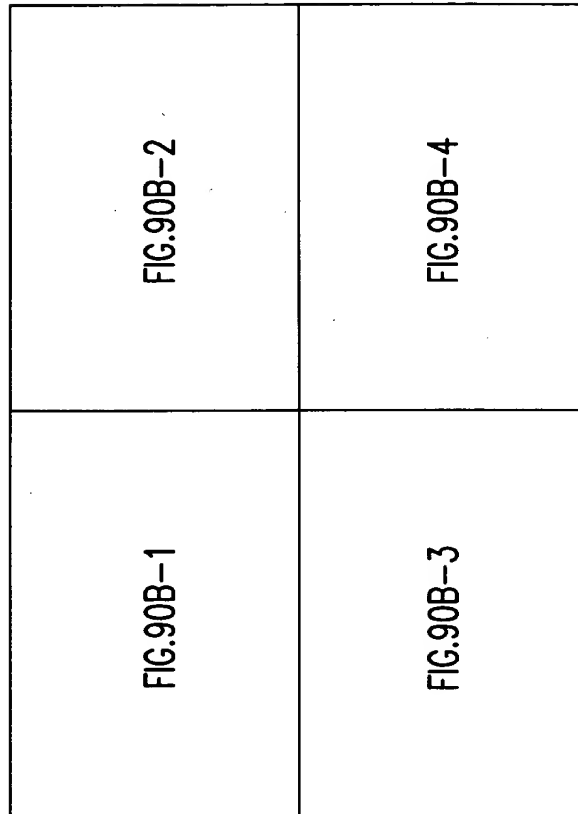


FIG.90B

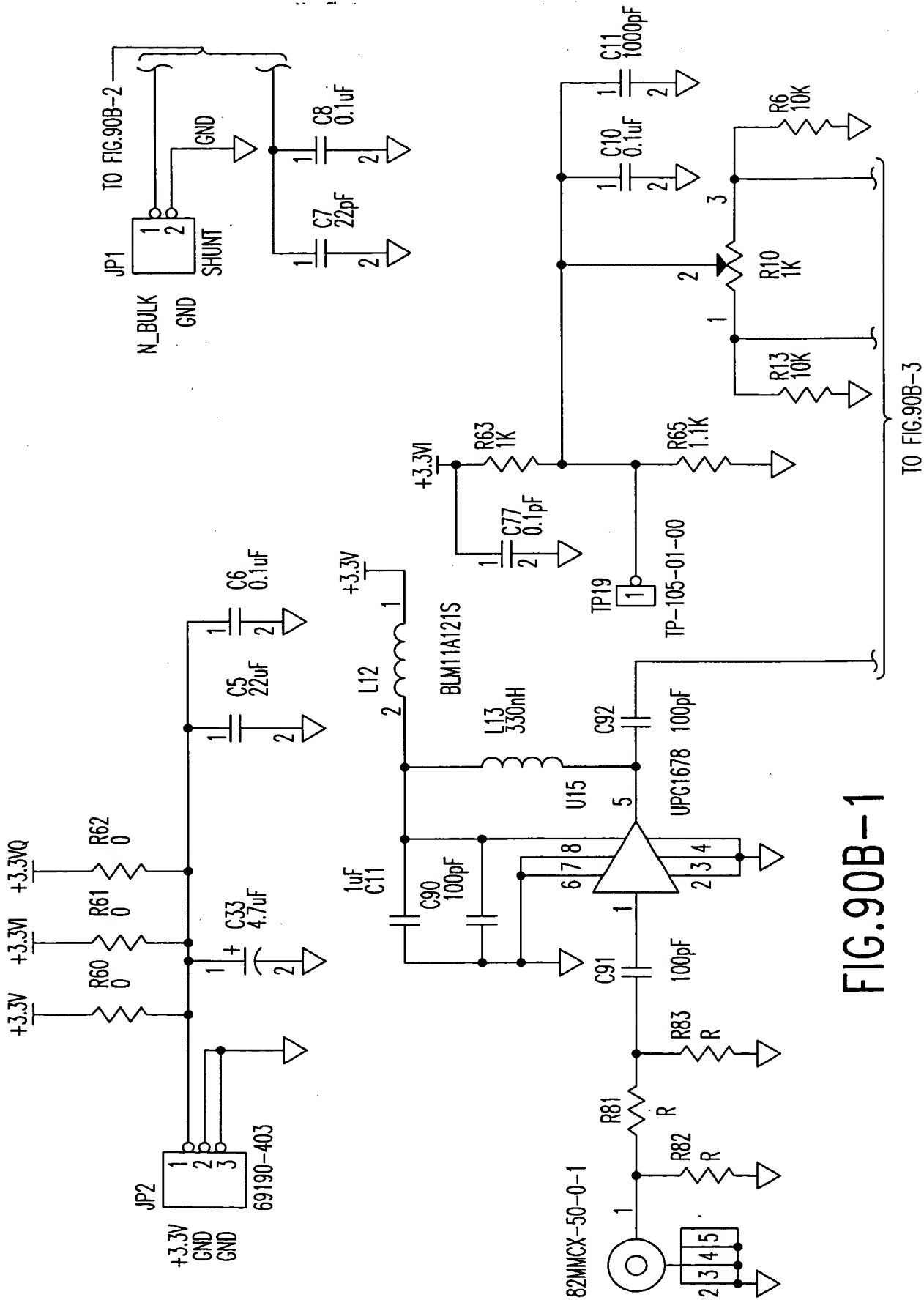
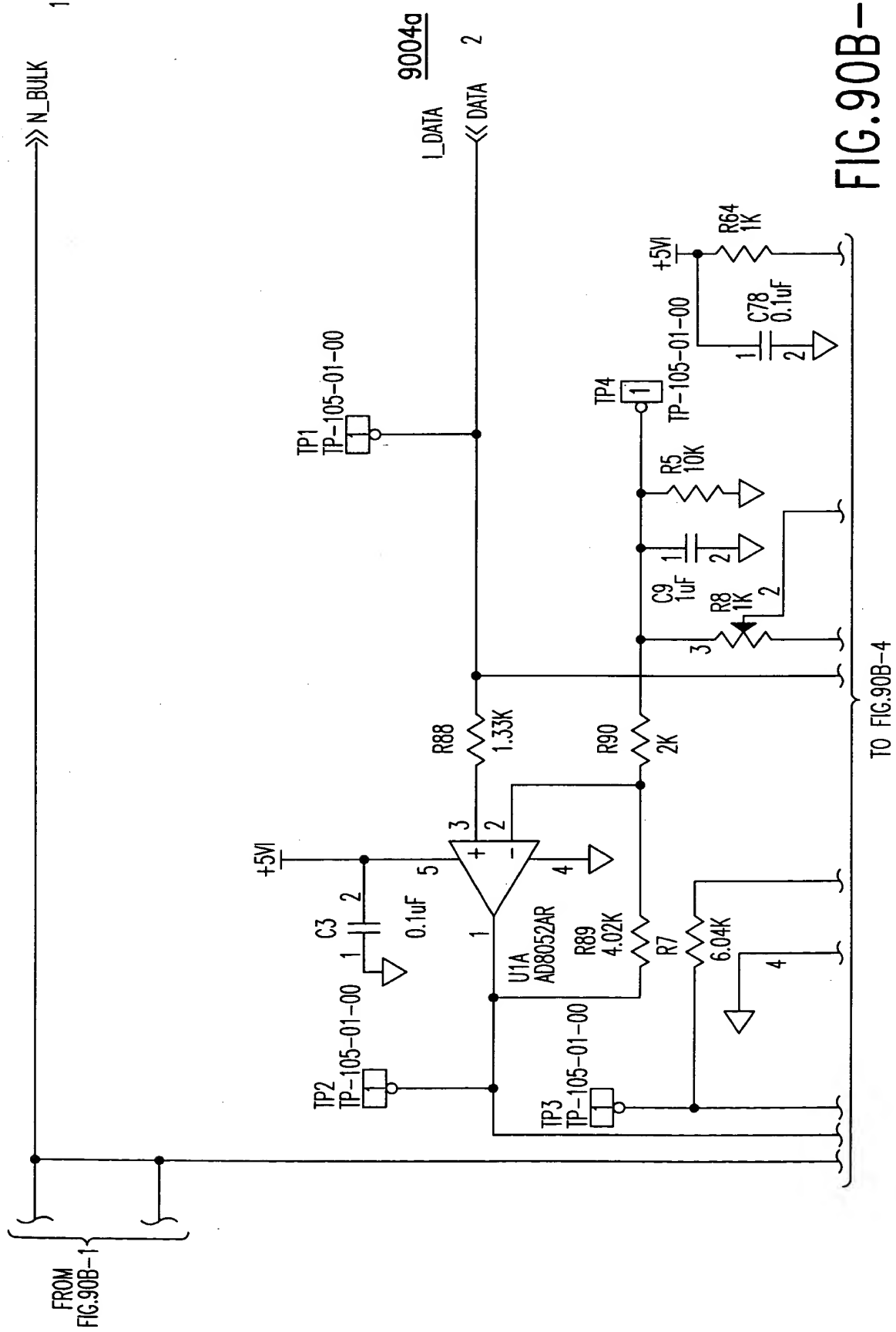


FIG. 90B-1



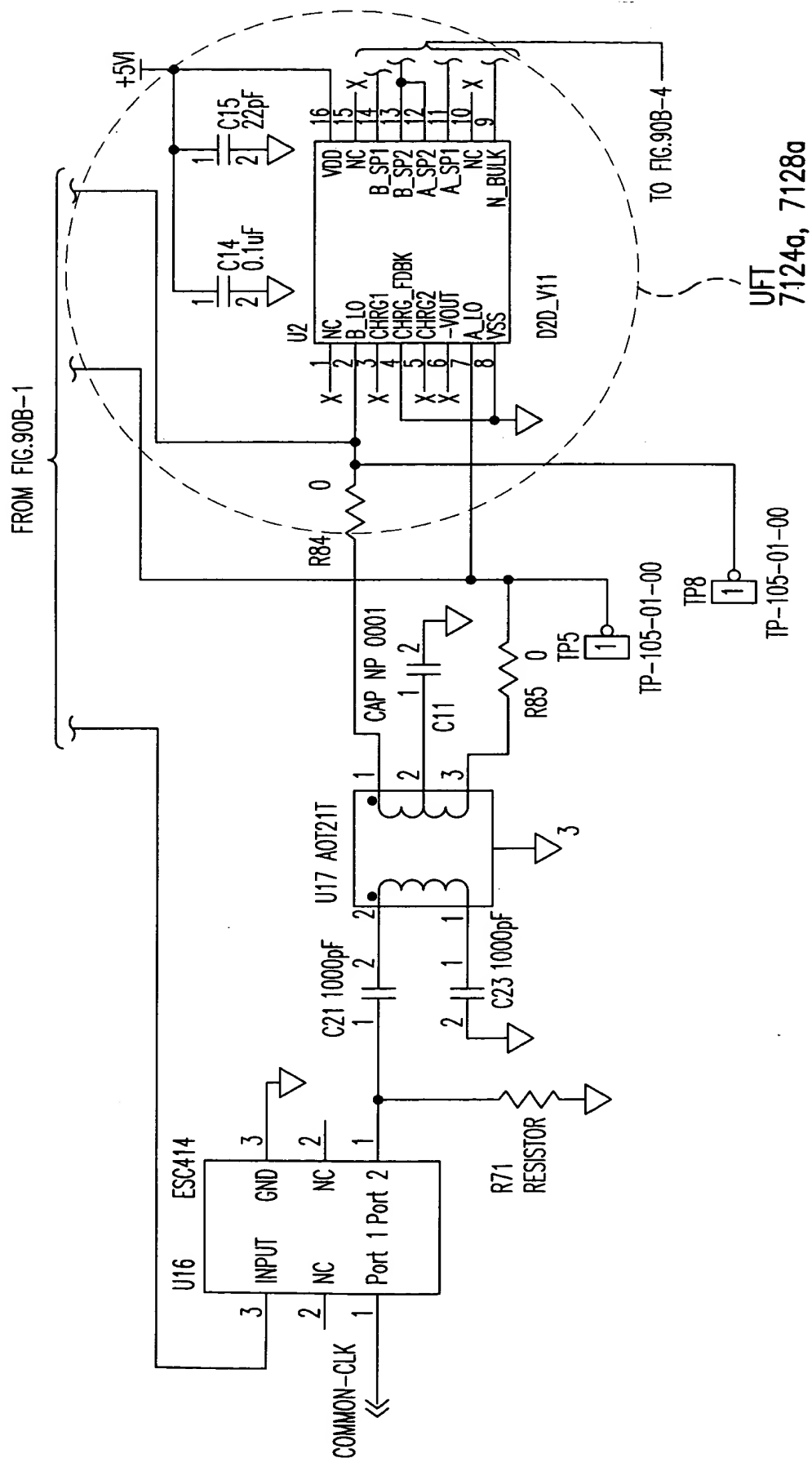


FIG. 90B-3

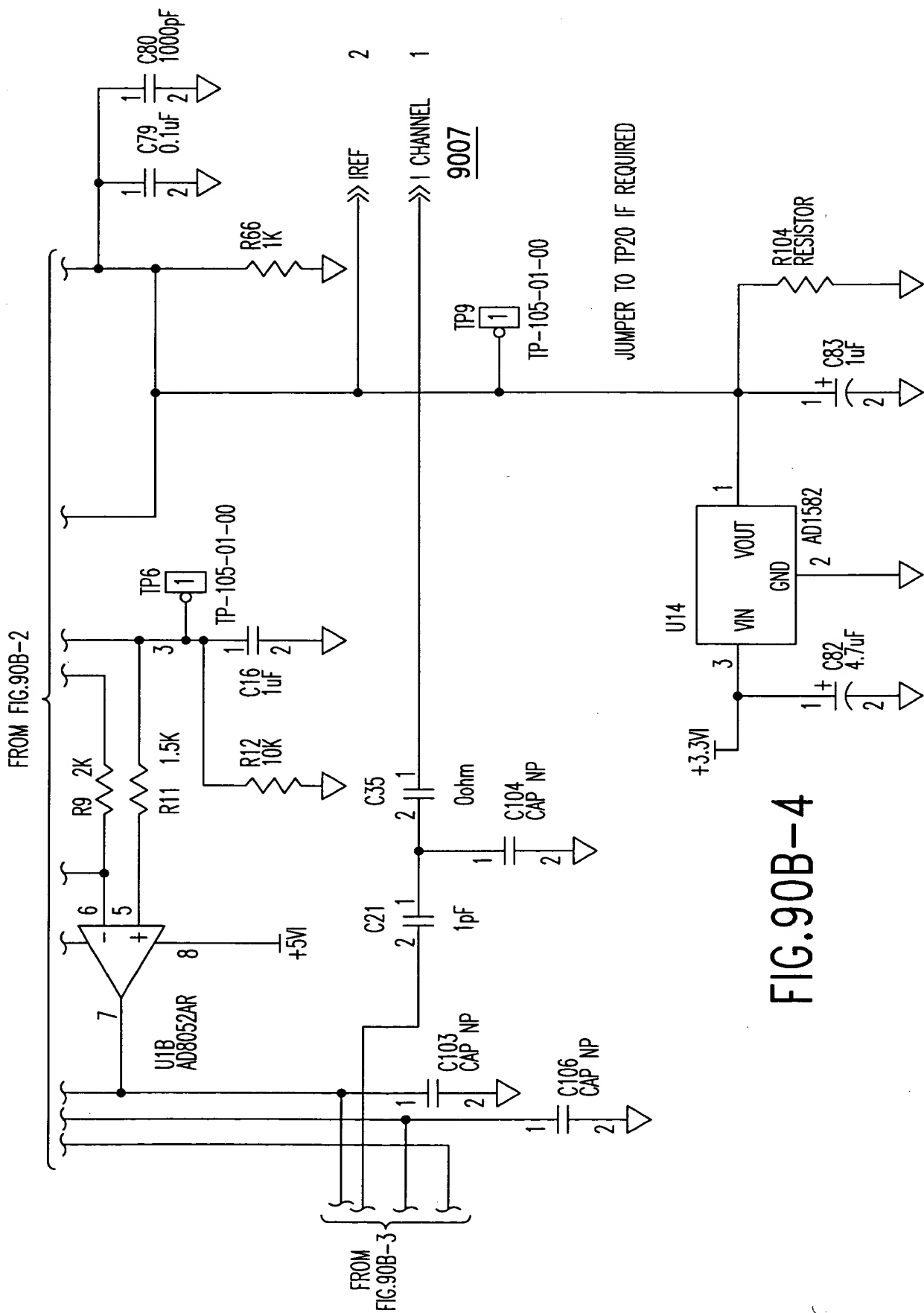


FIG.90B-4

FIG.90C-1	FIG.90C-2
FIG.90C-3	FIG.90C-4

FIG.90C

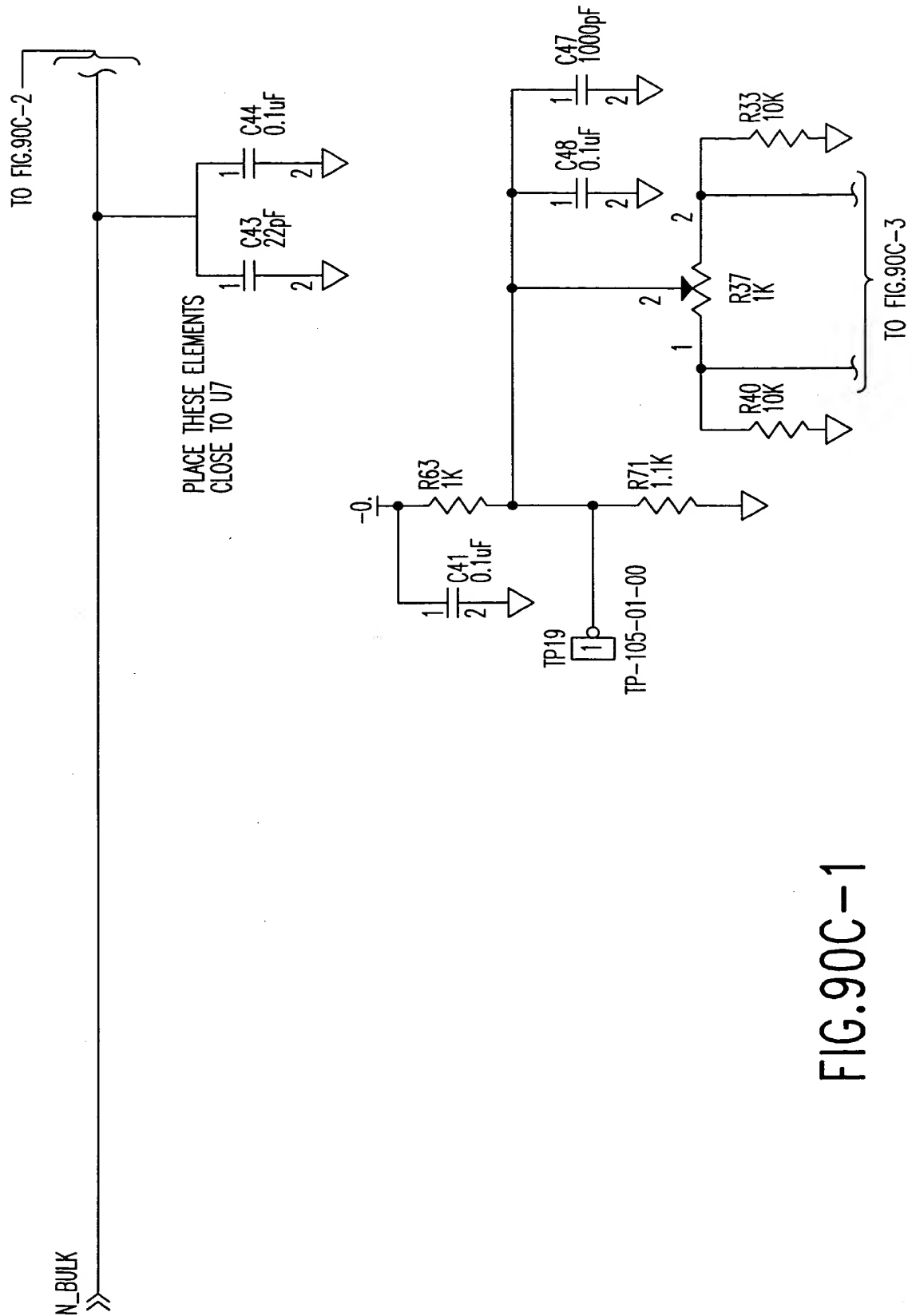


FIG.90C-1

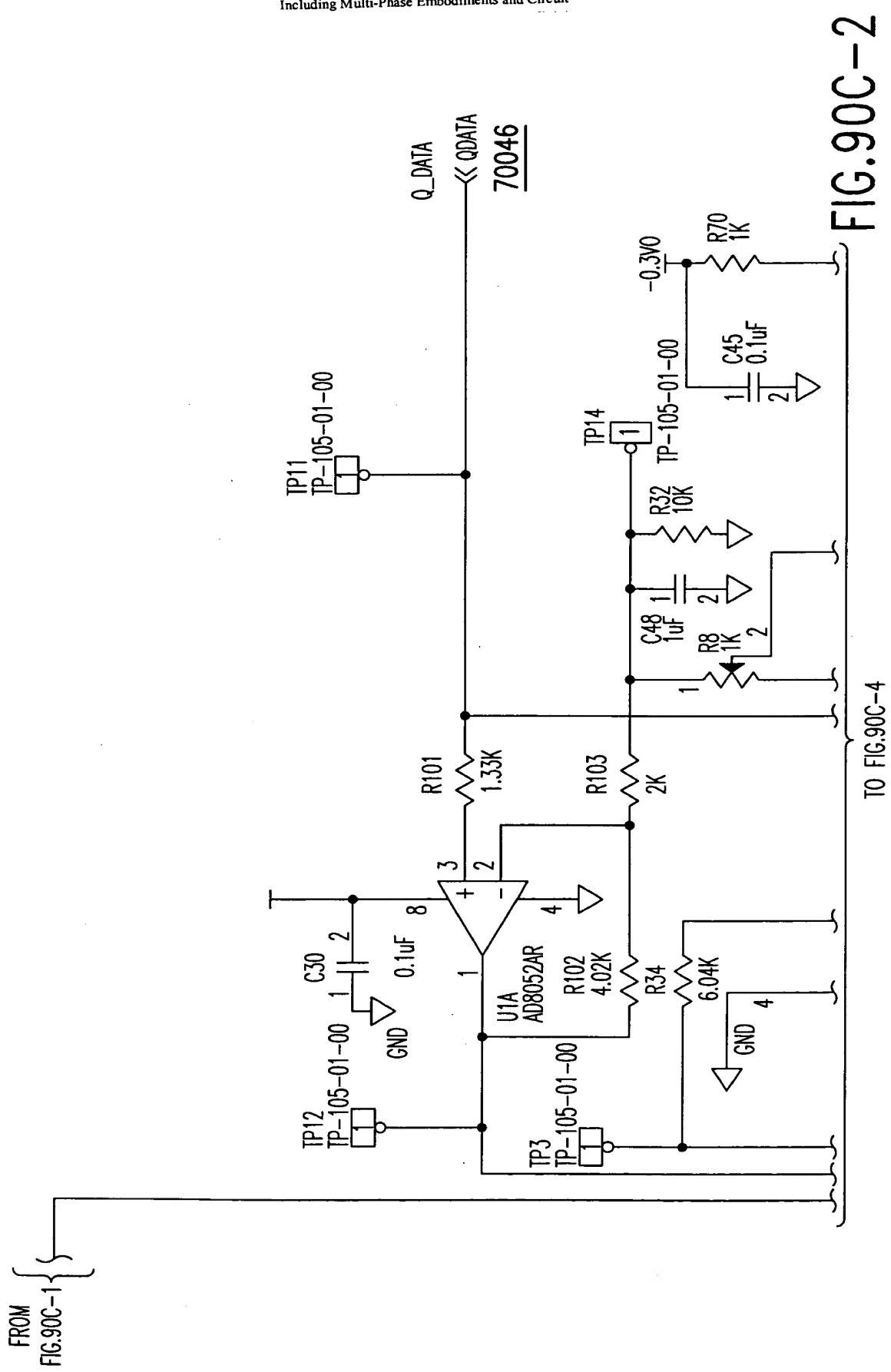


FIG. 90C-2



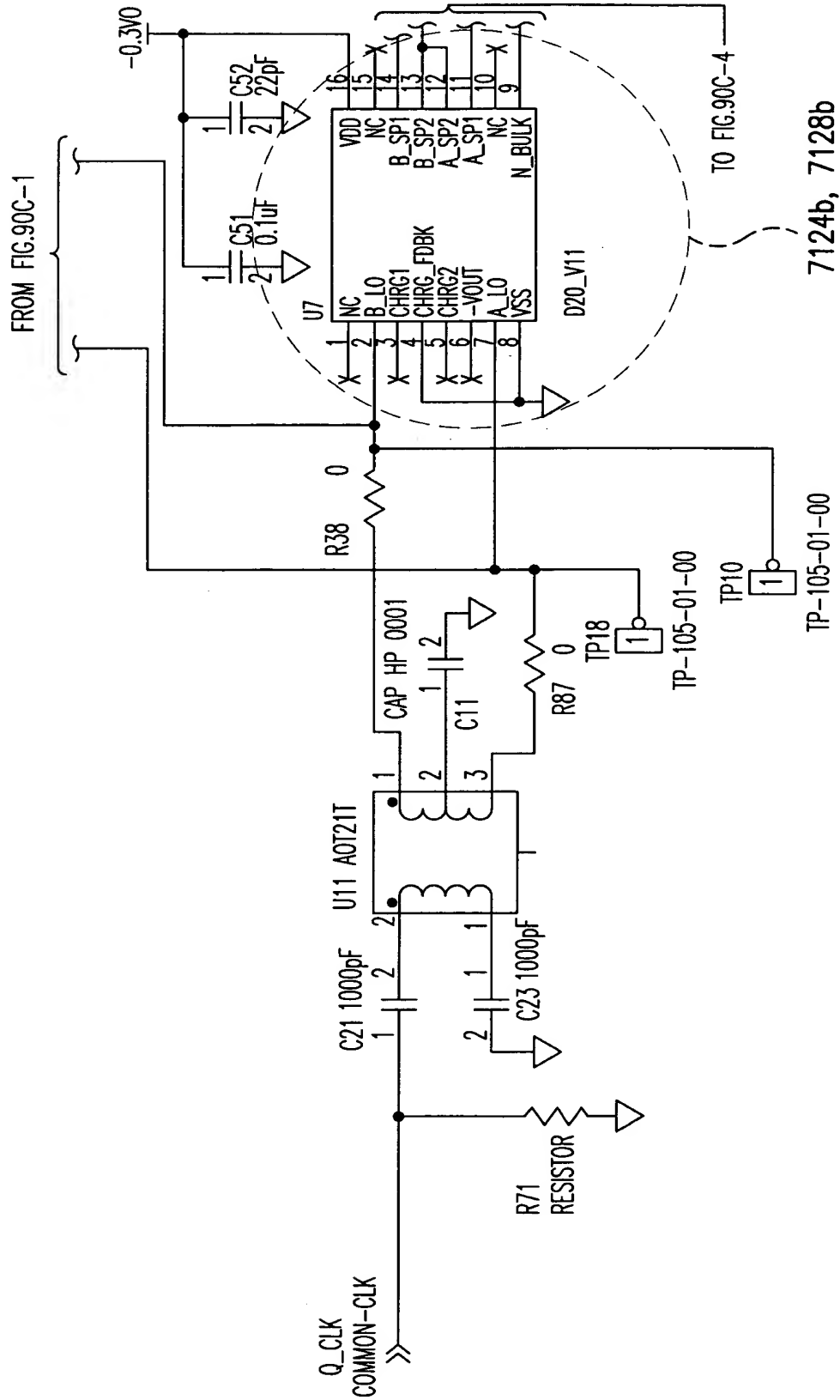
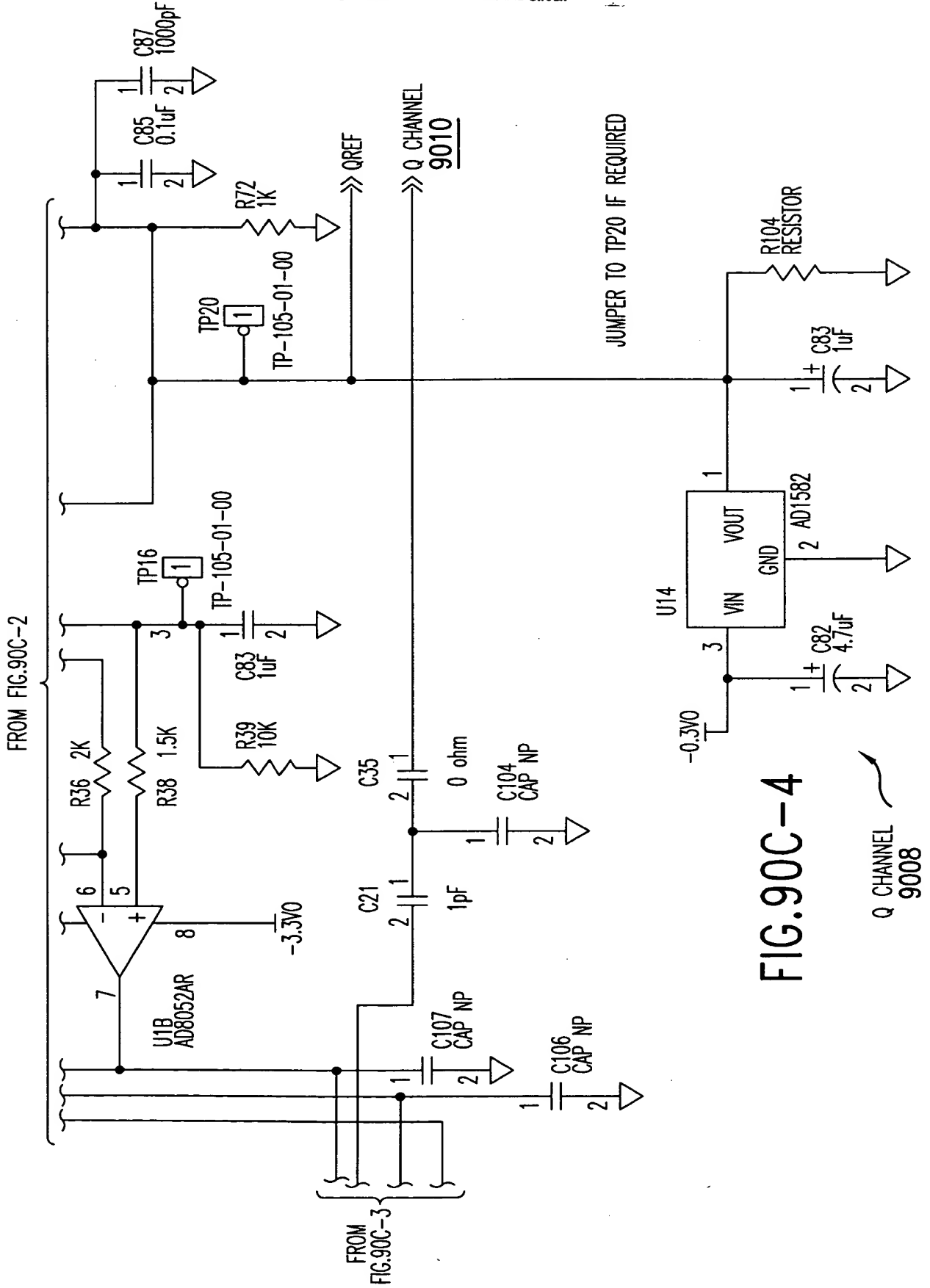
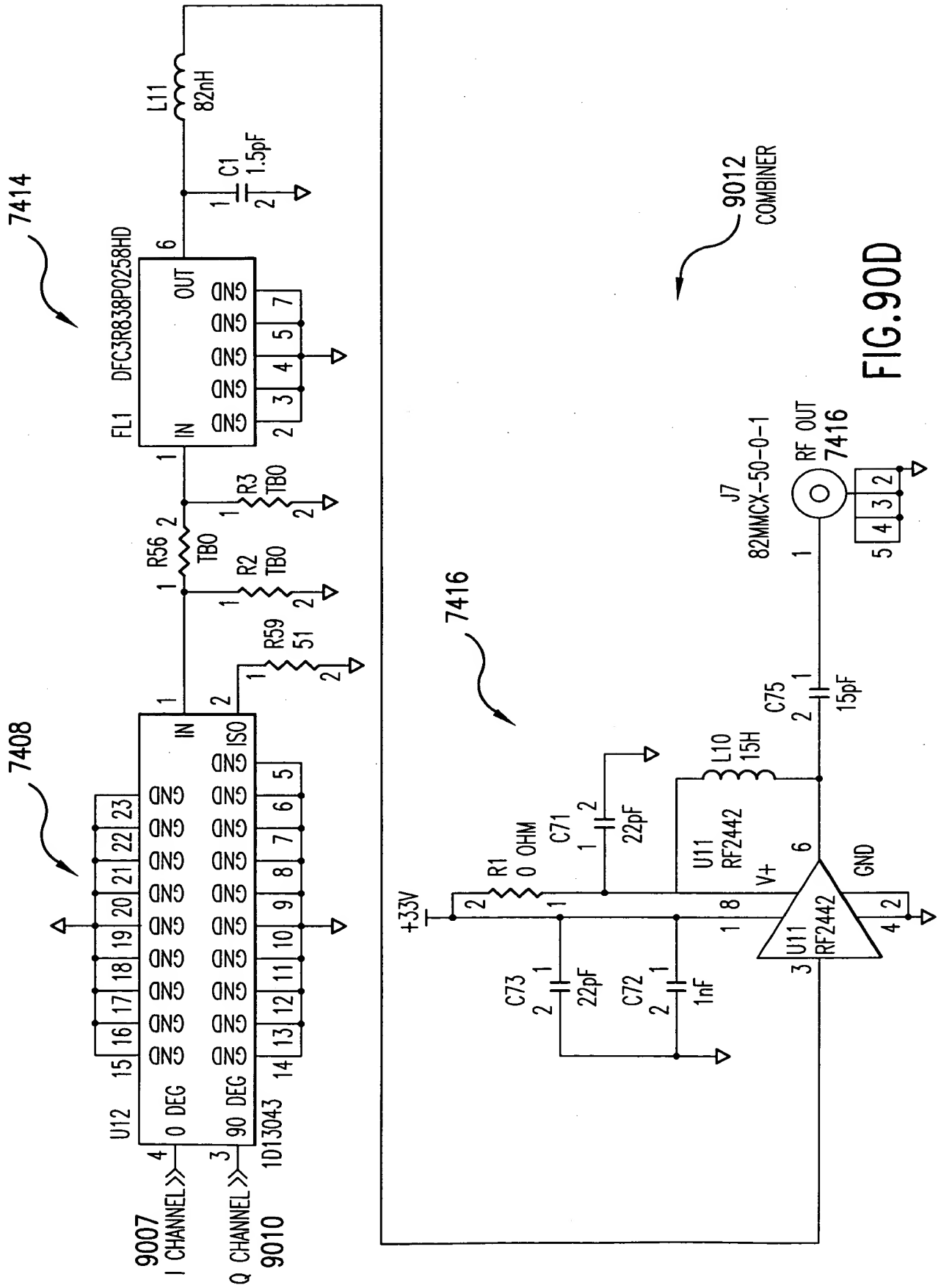


FIG.90C-3





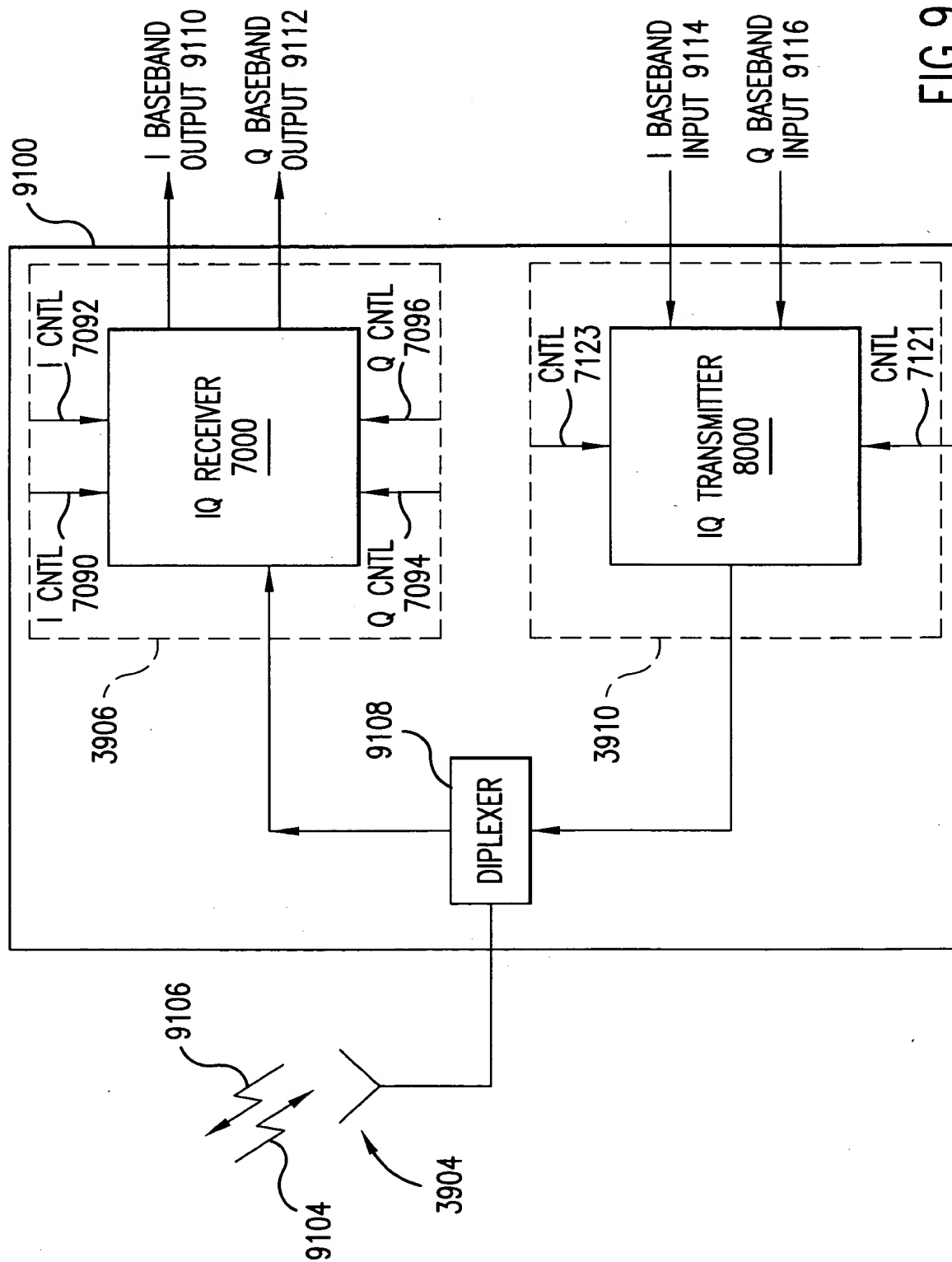


FIG. 91

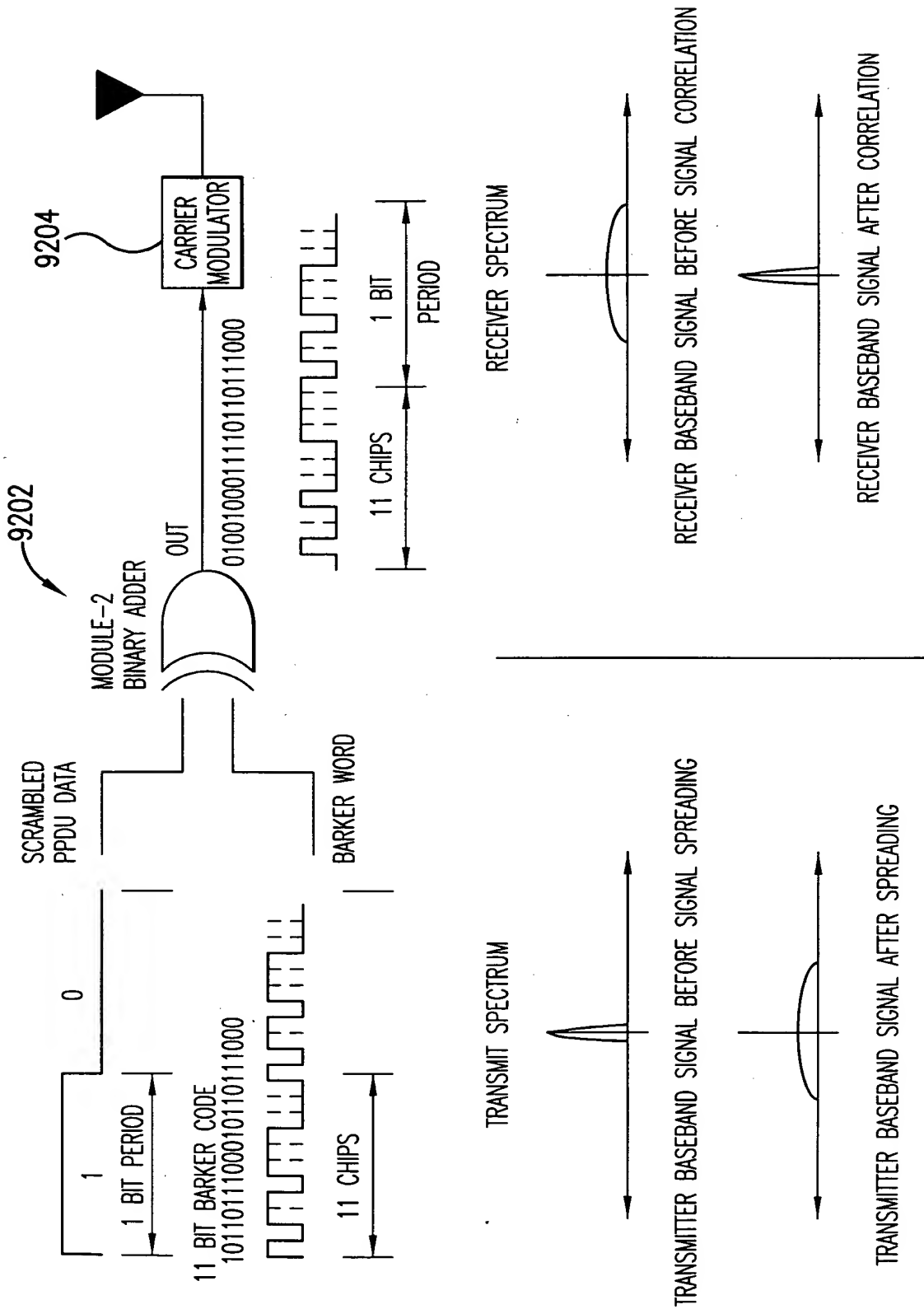


FIG.92

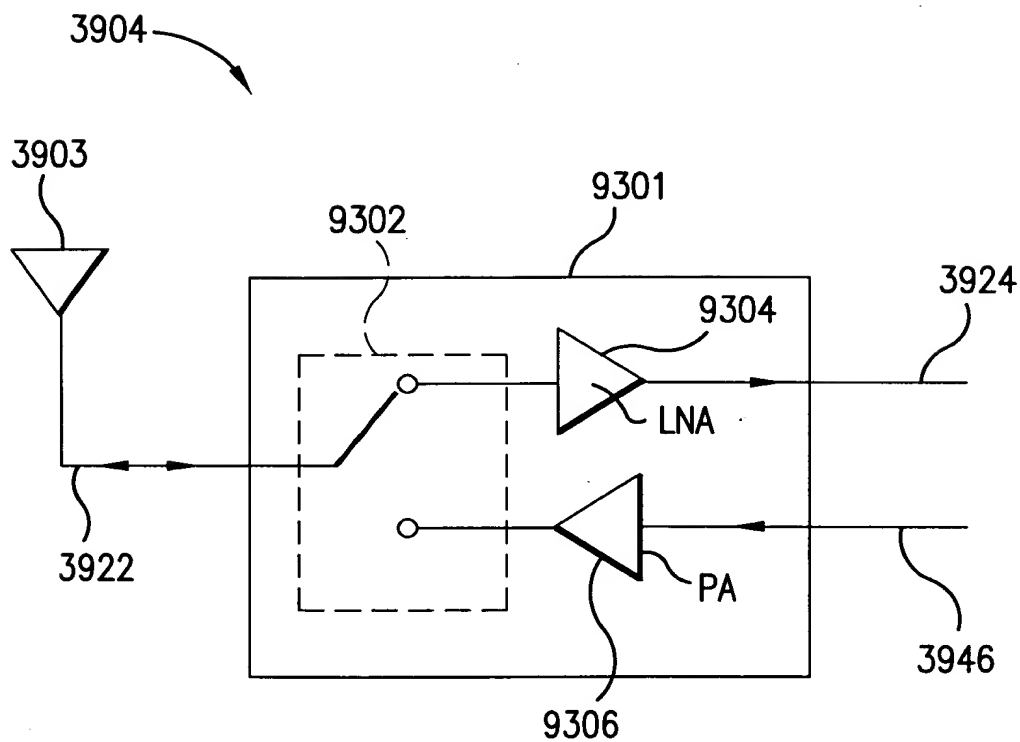


FIG.93

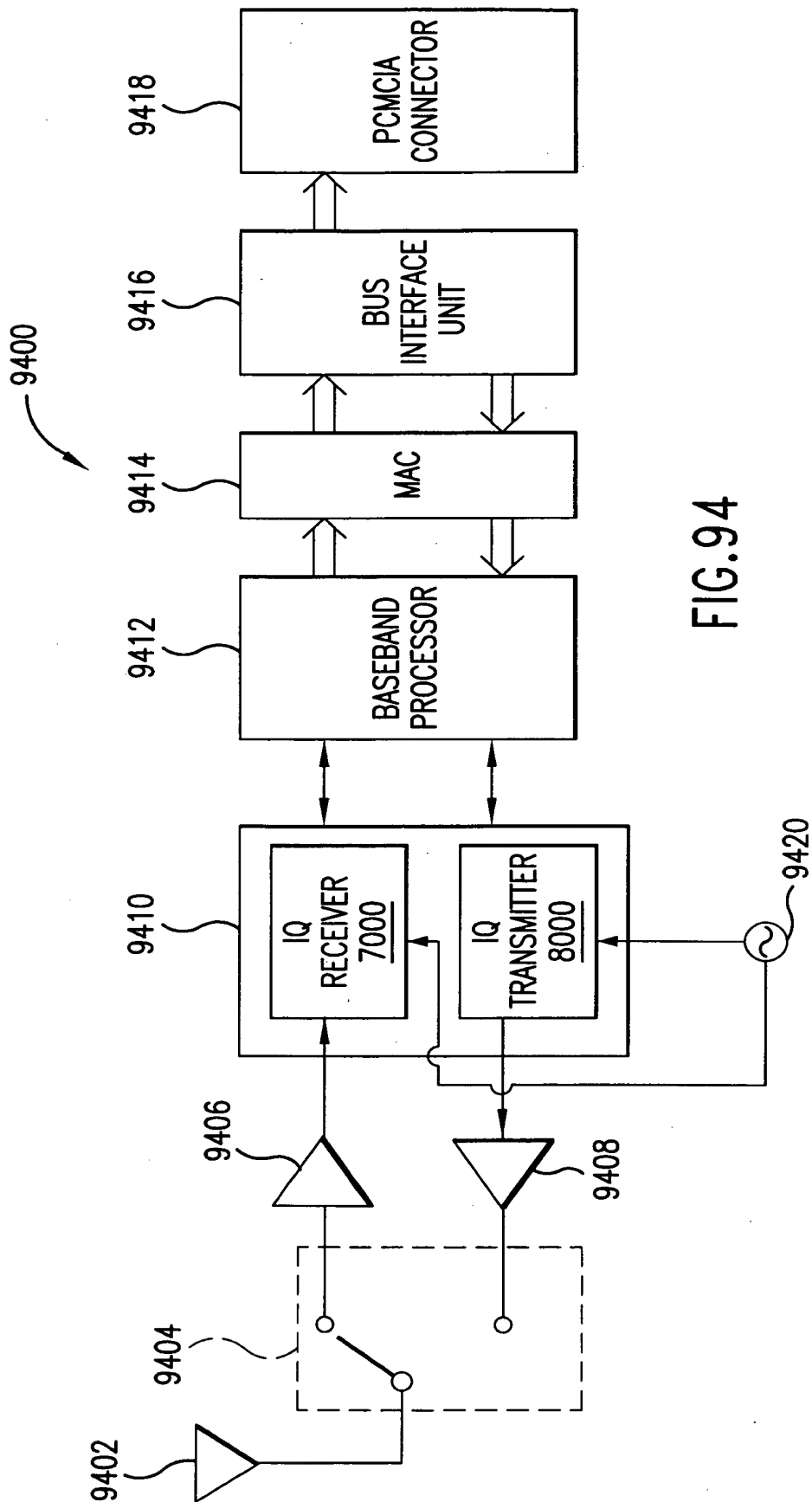


FIG.94

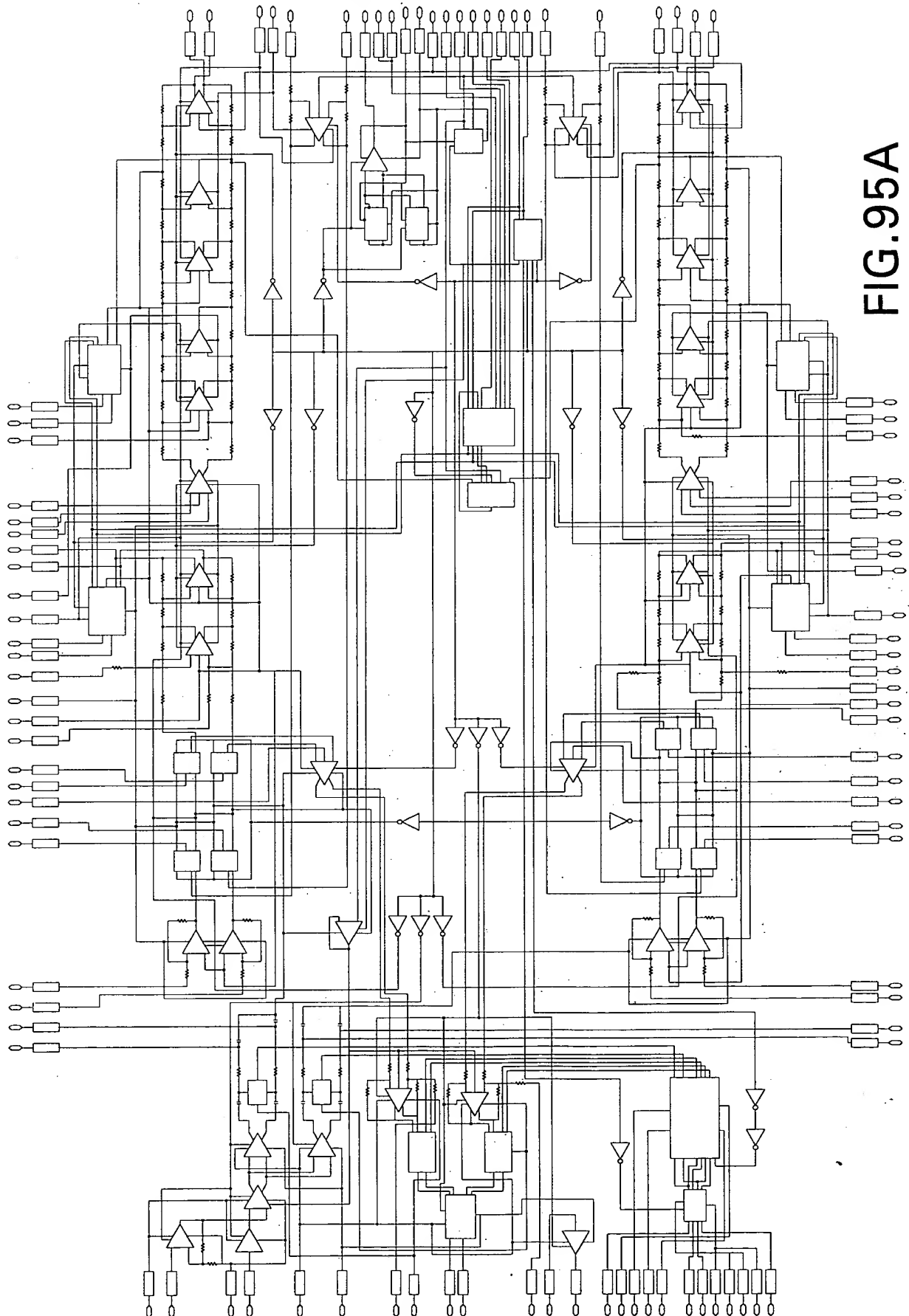


FIG. 95A



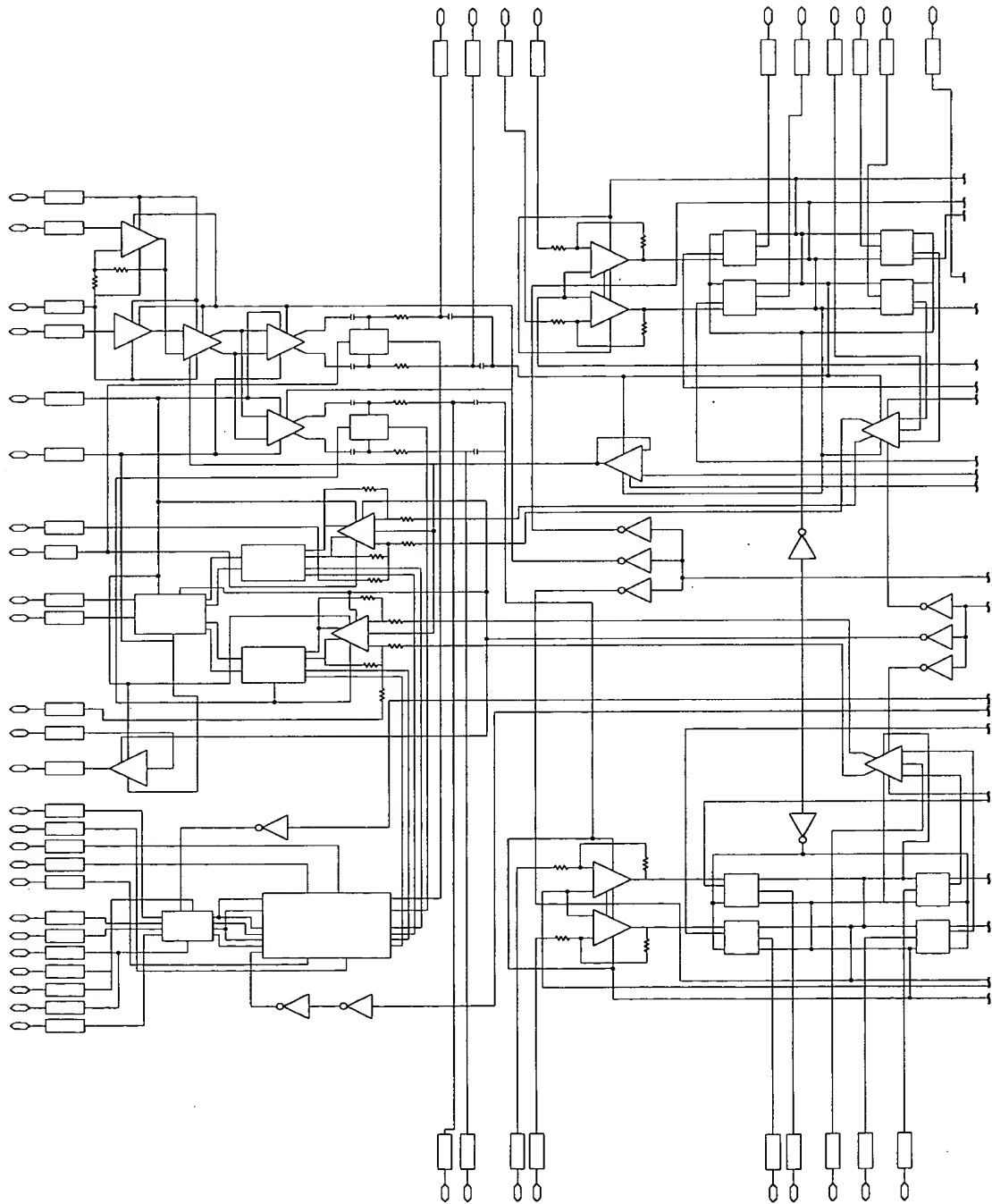


FIG. 95B

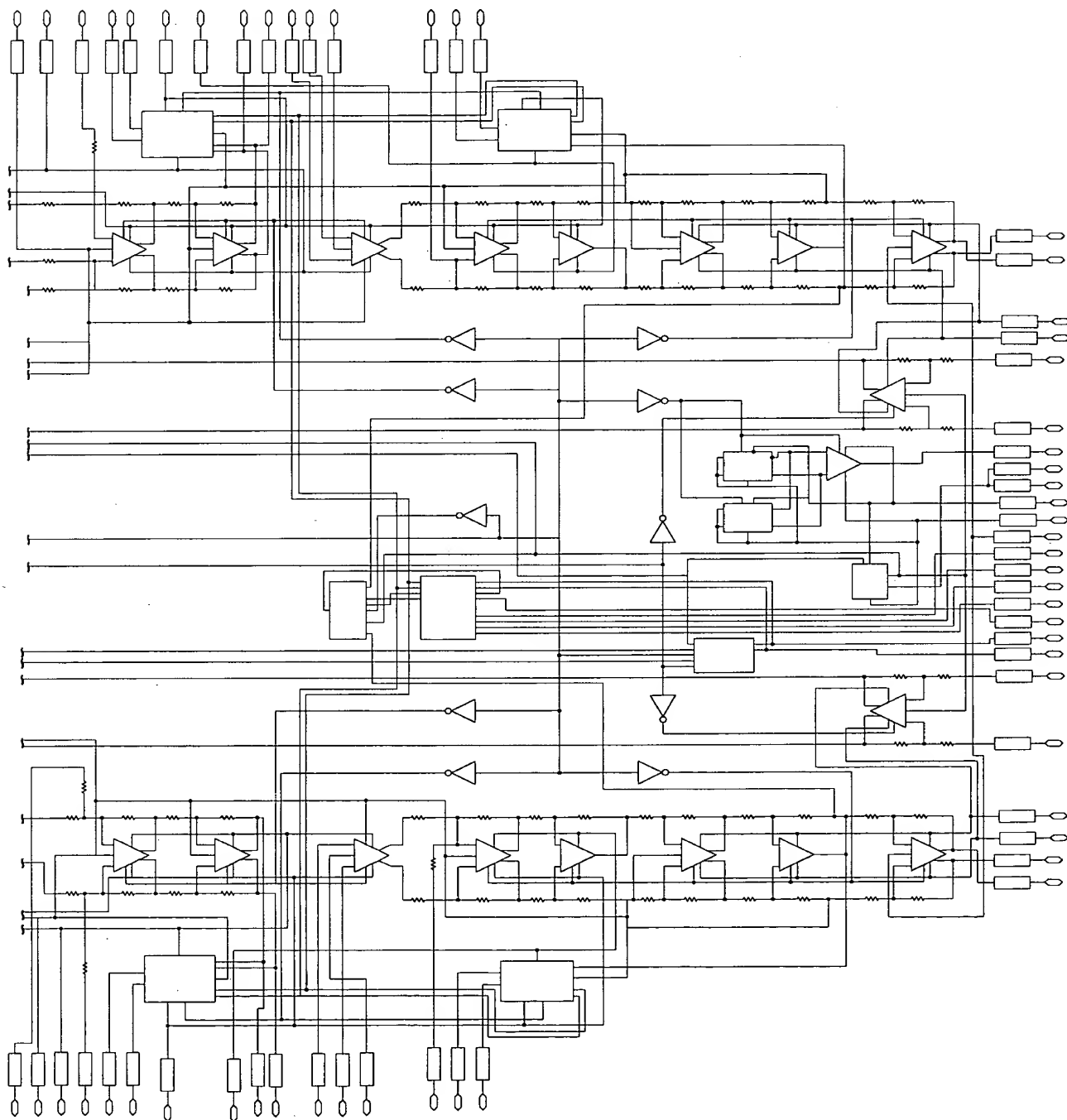


FIG. 95C

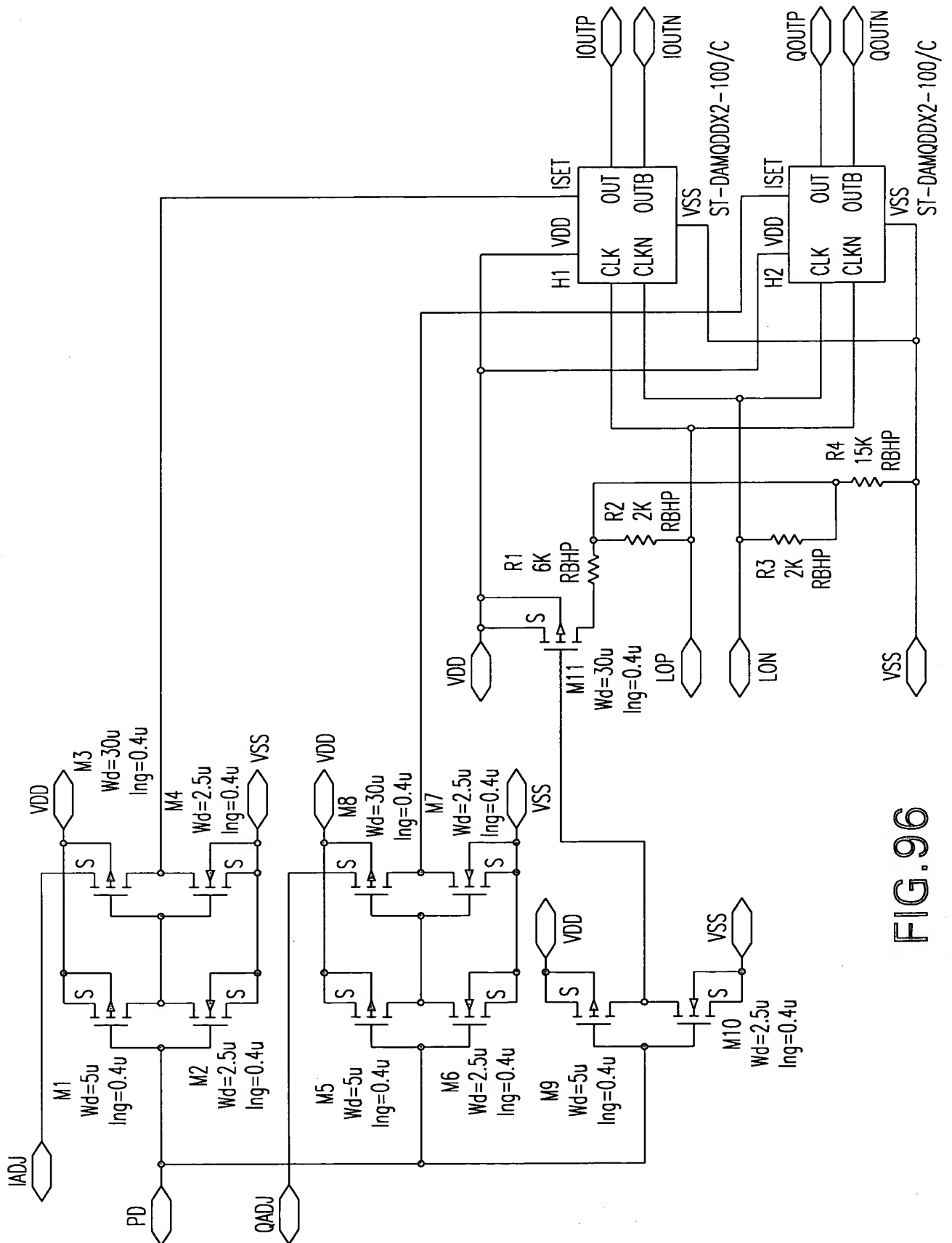


FIG. 96

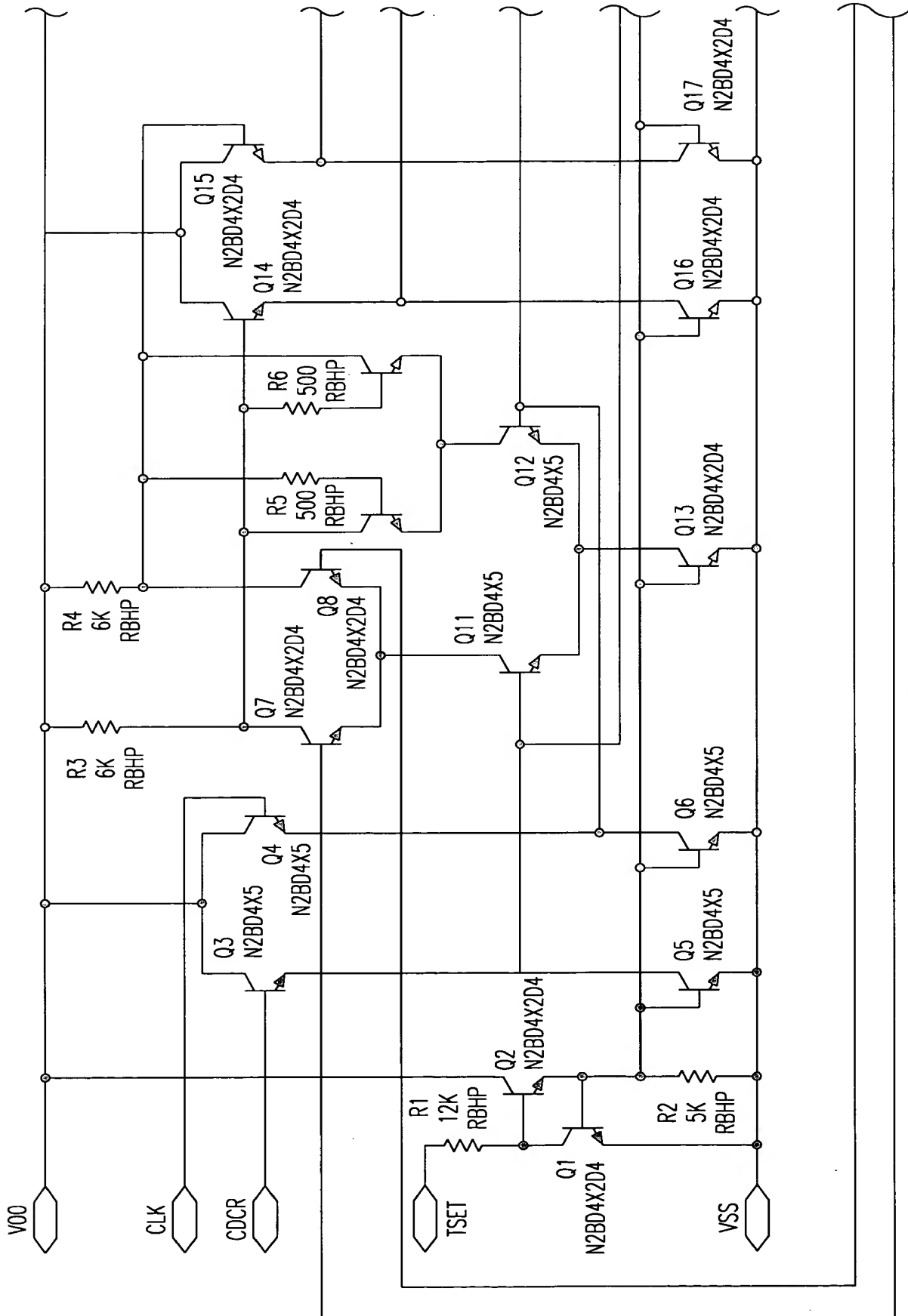


FIG. 97A

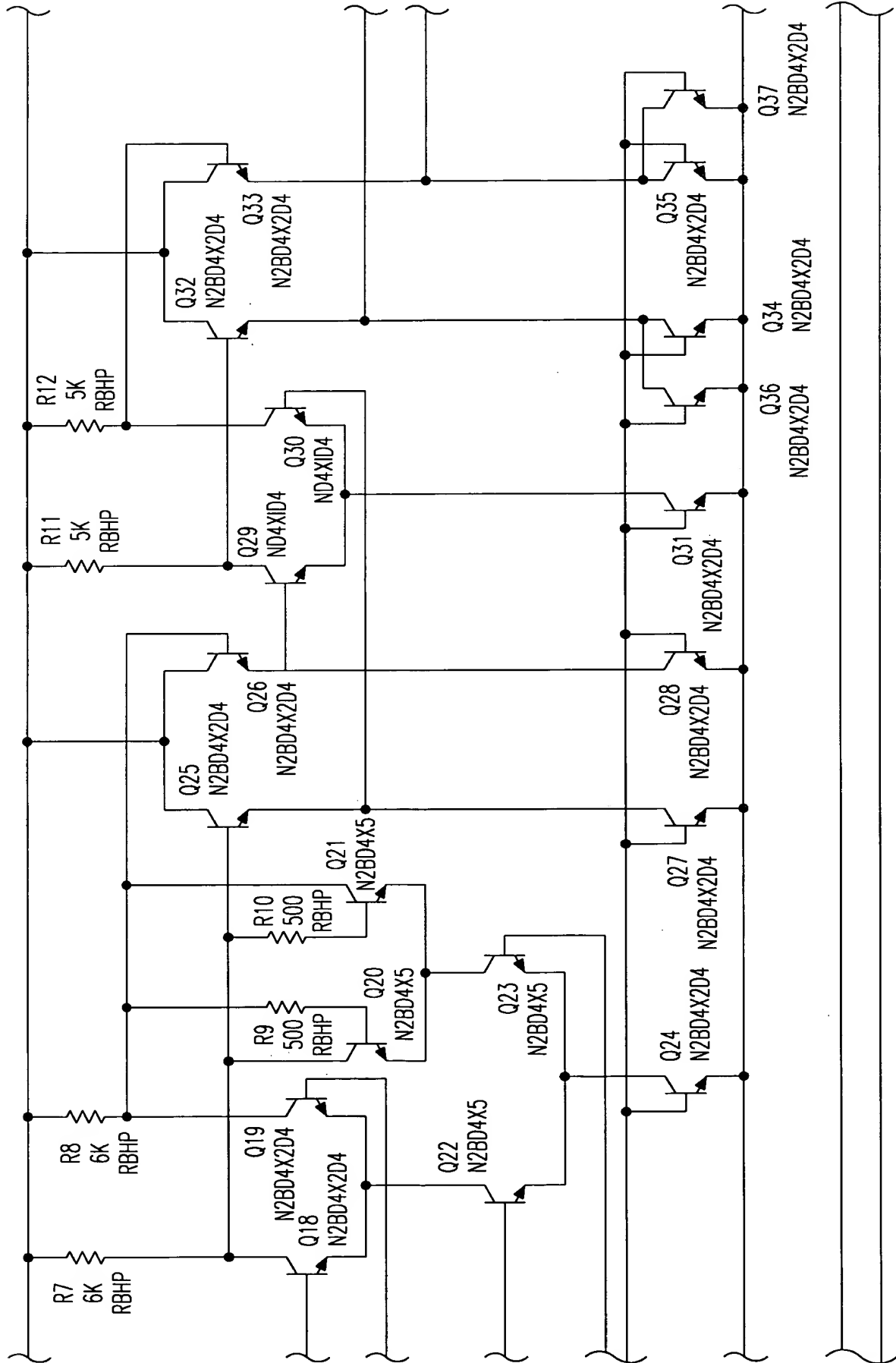


FIG. 97B

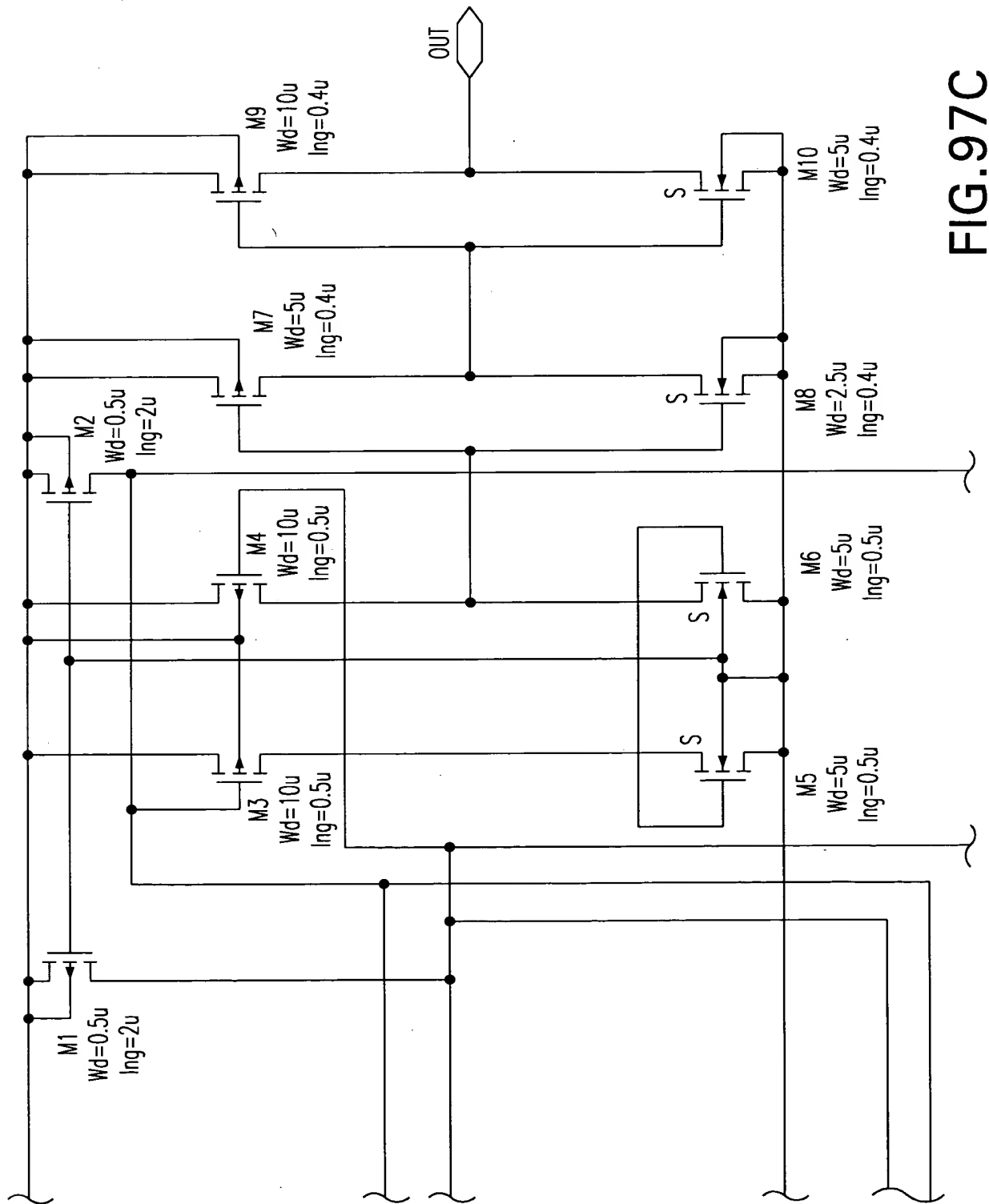


FIG. 97C

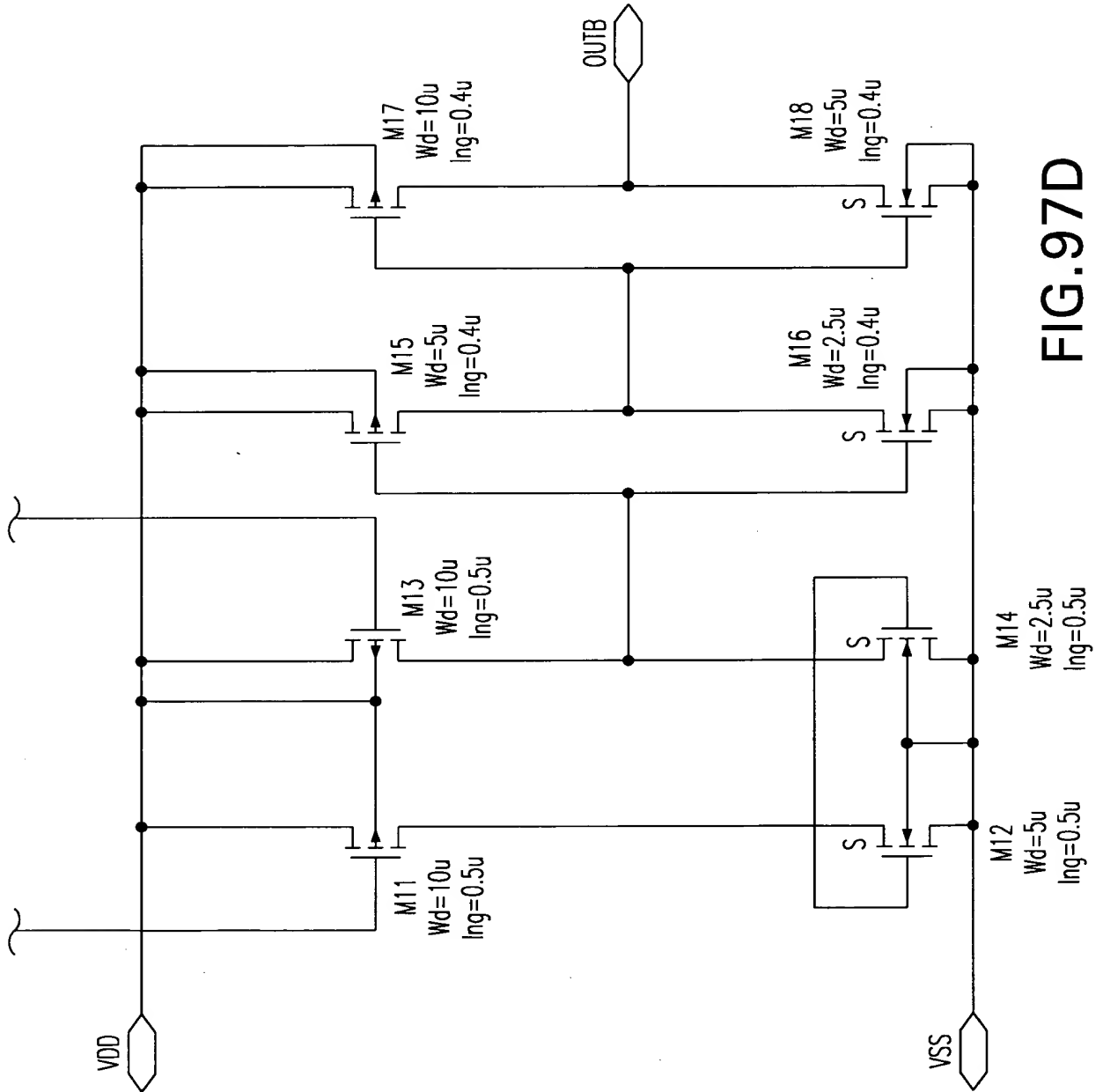


FIG. 97D

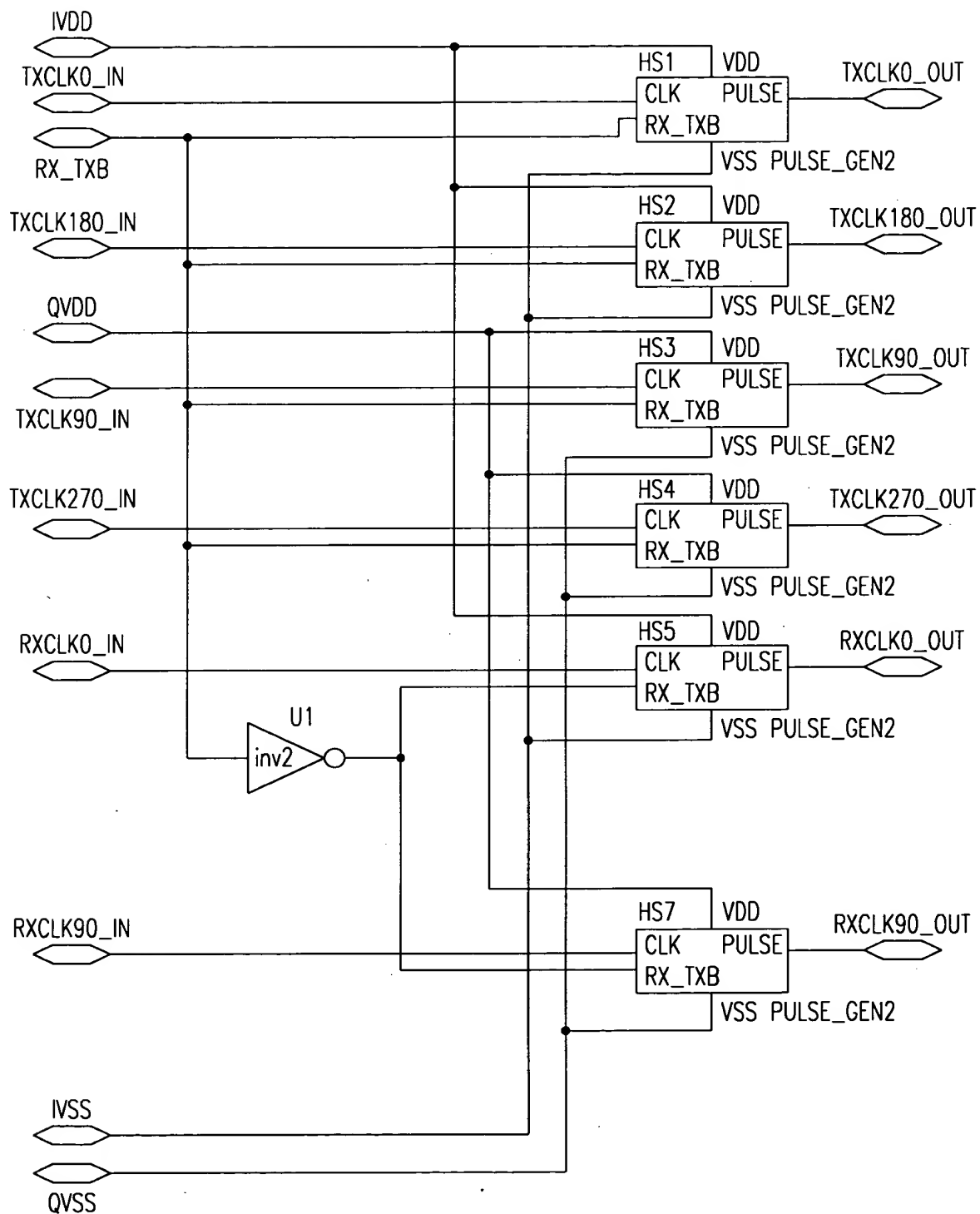


FIG.98



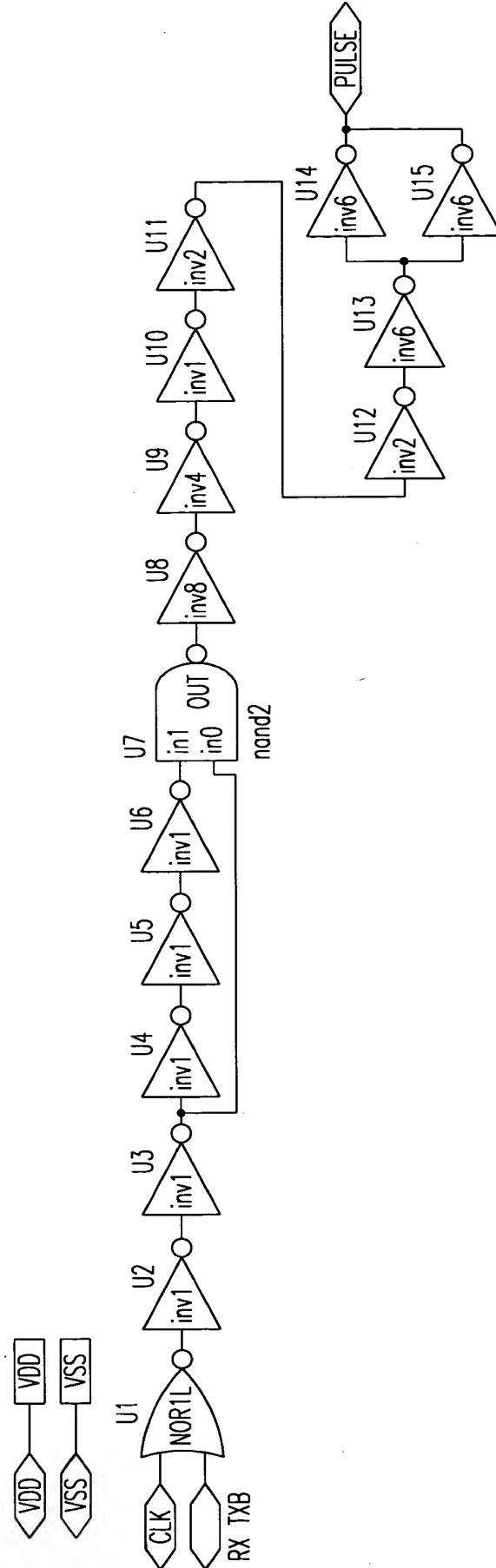


FIG. 99

FIG. 100

FIG. 10

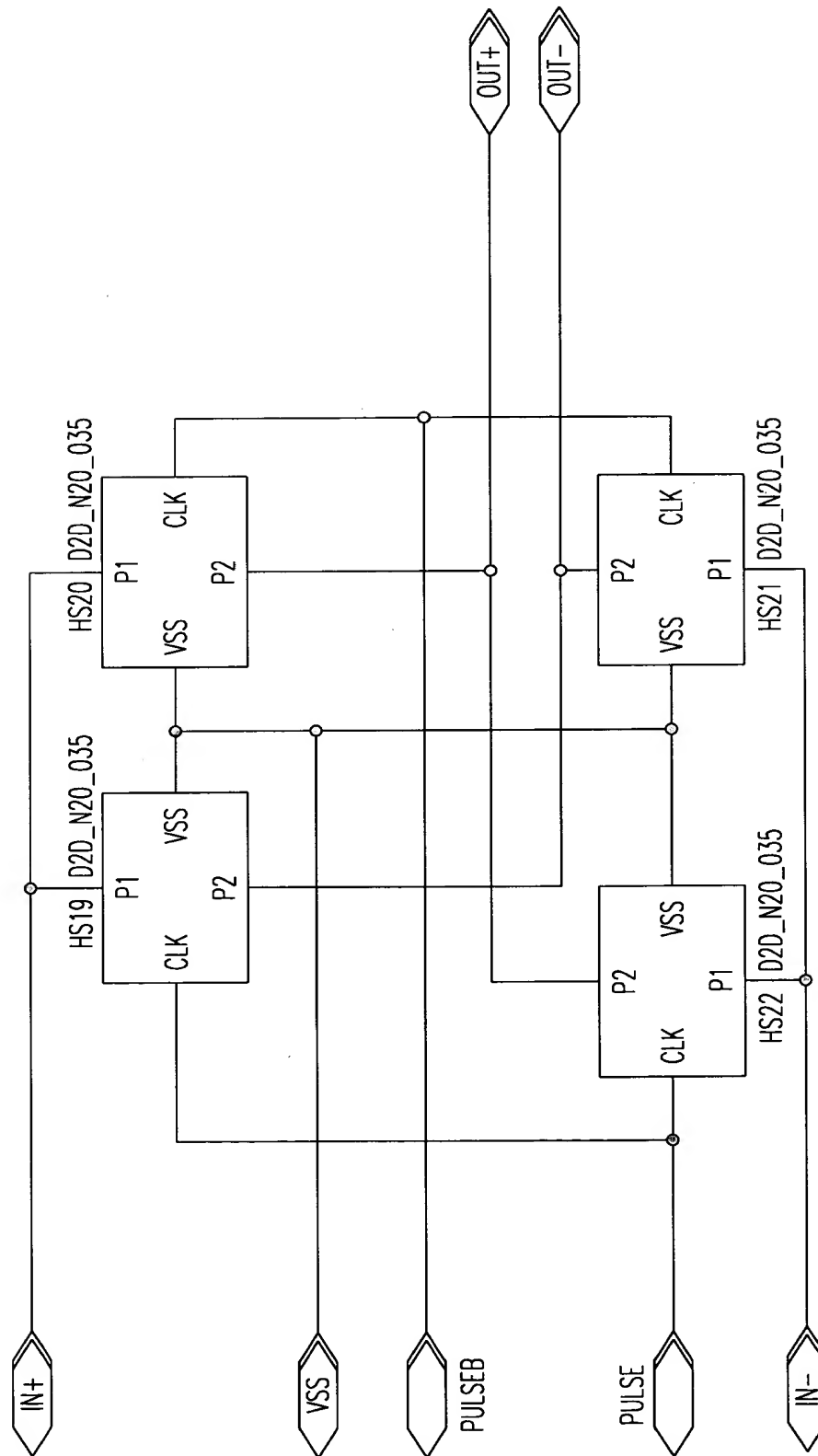


FIG. 102



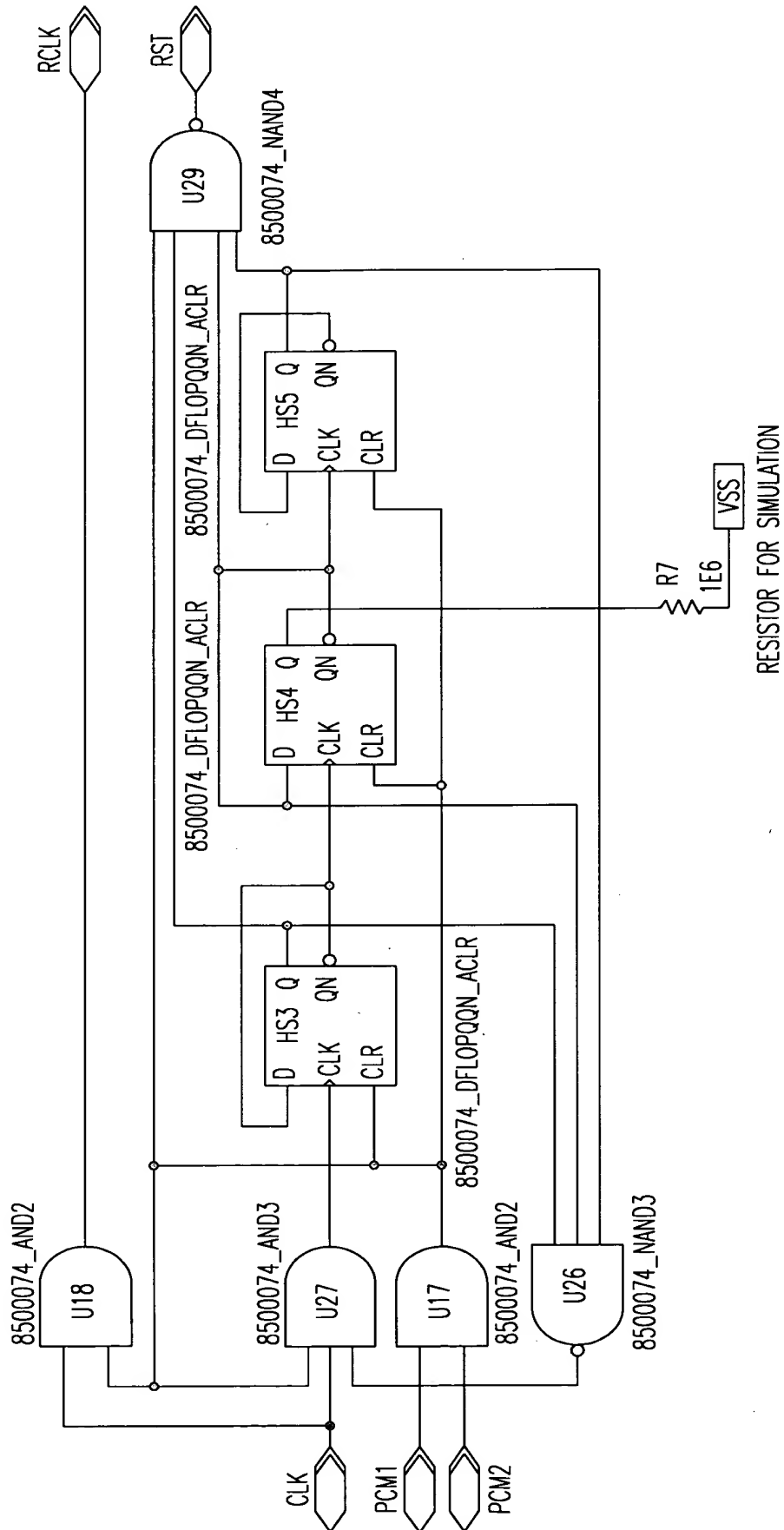
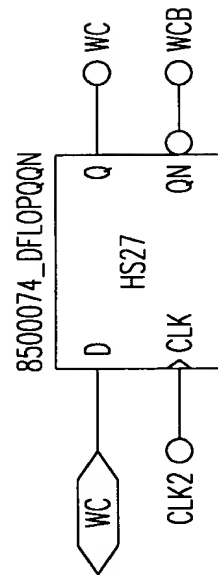


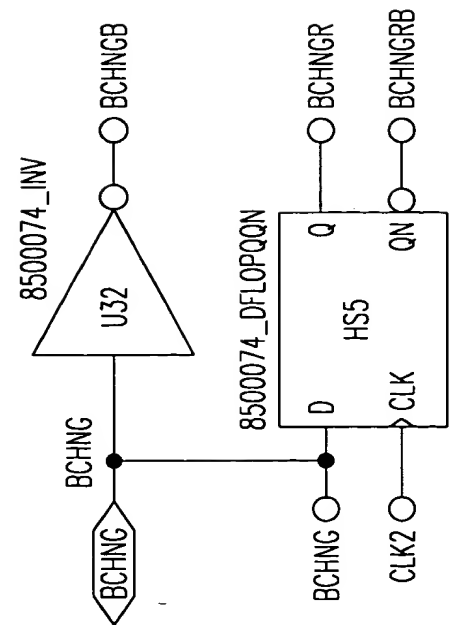
FIG. 104





**FIG. 105A**





**FIG. 105B**

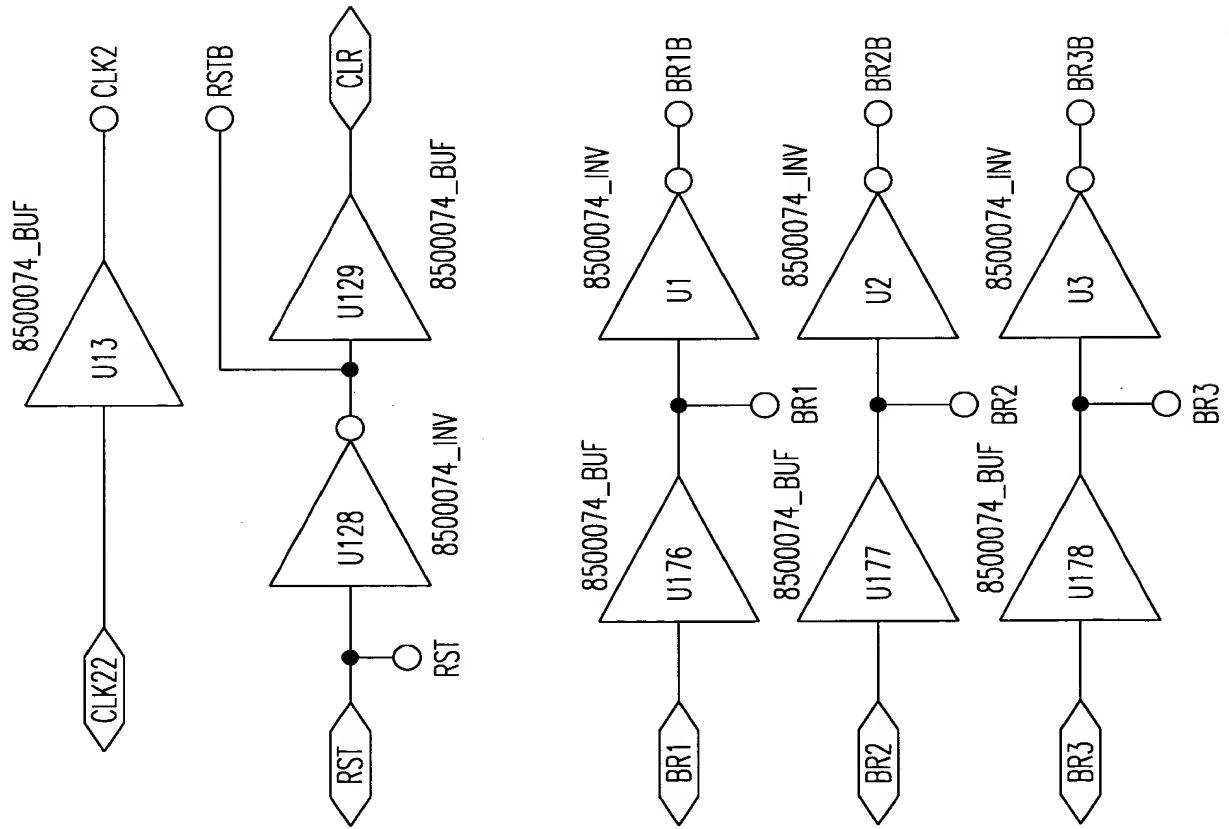
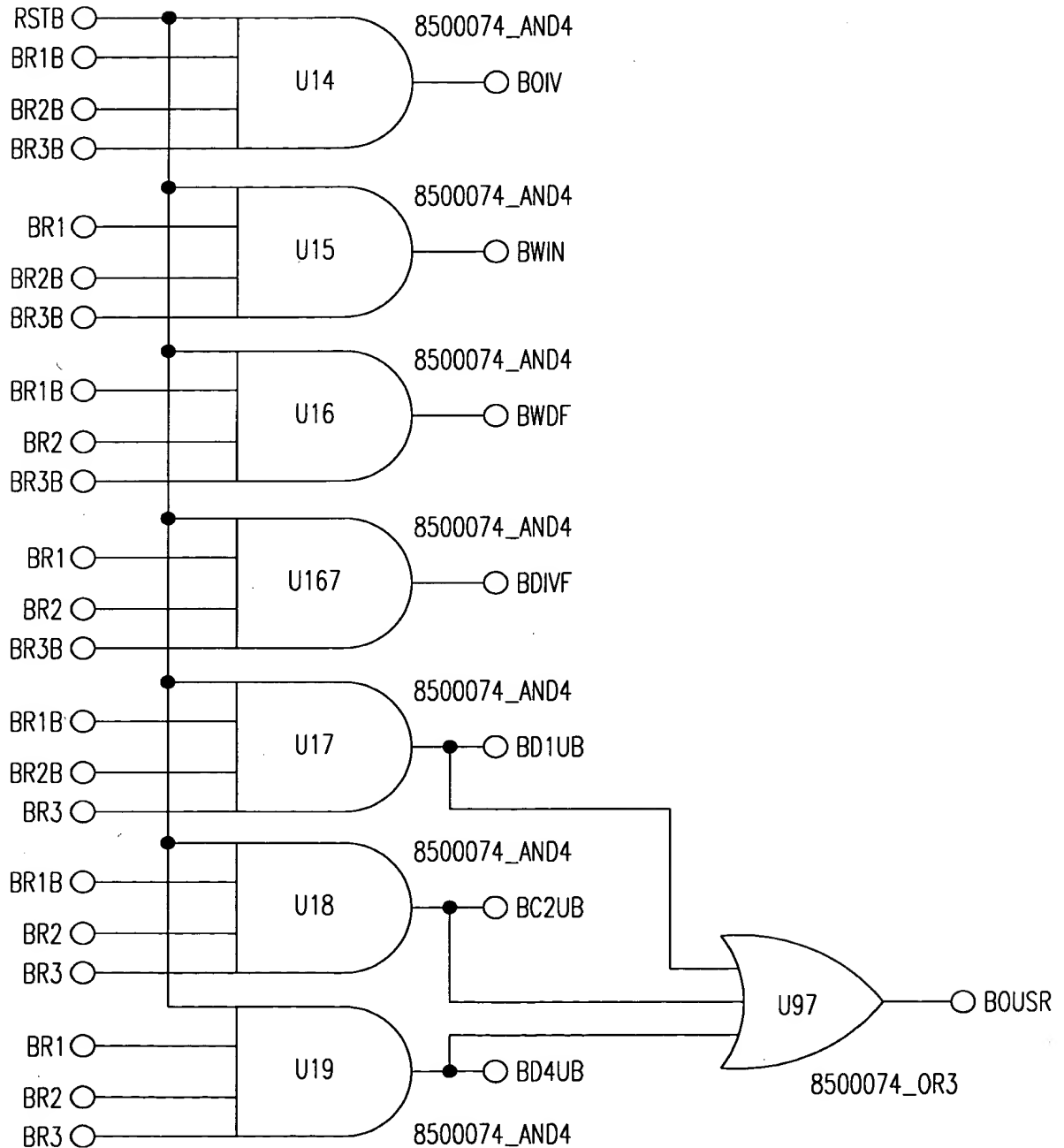


FIG. 105C



**FIG. 105D**

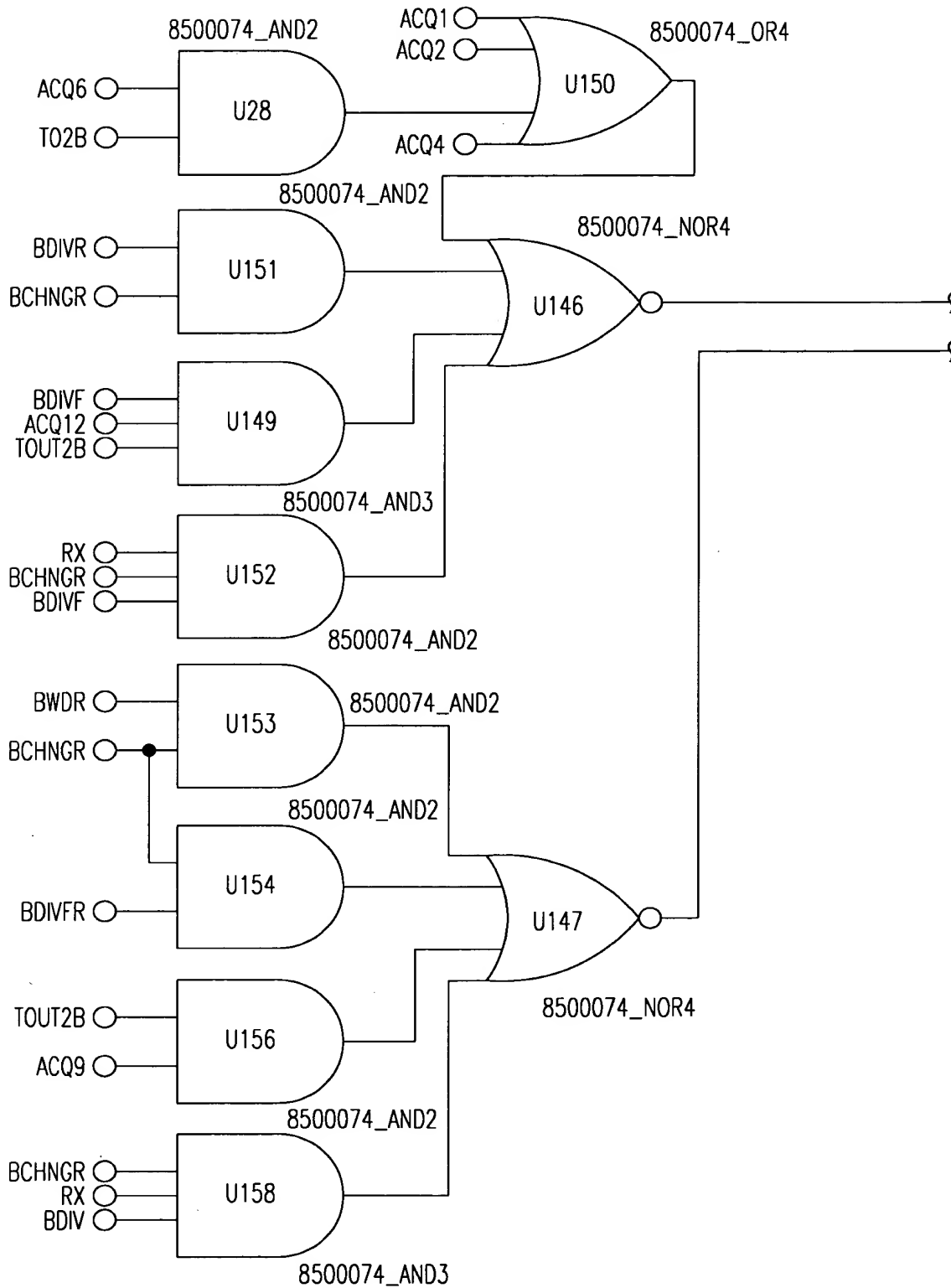
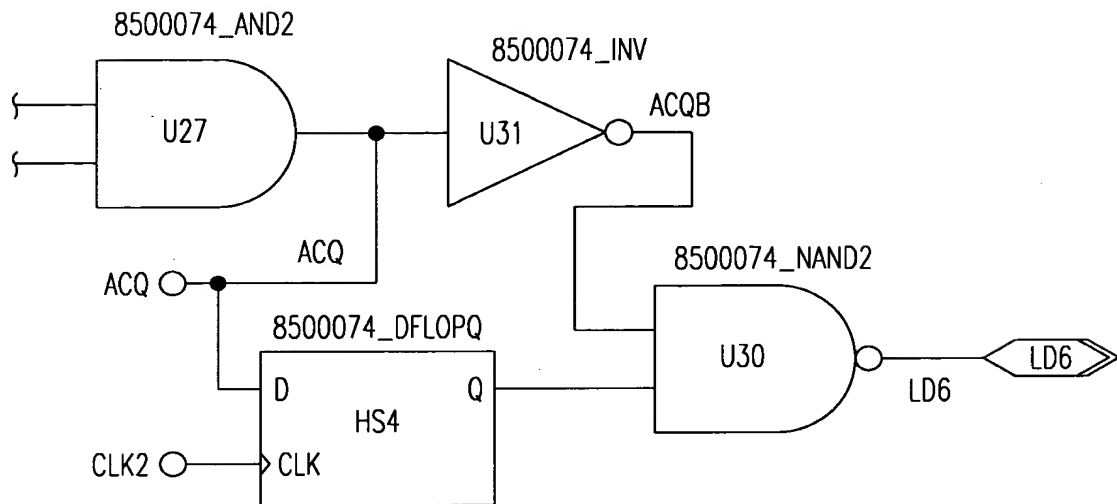


FIG.105E-1



**FIG.105E-2**

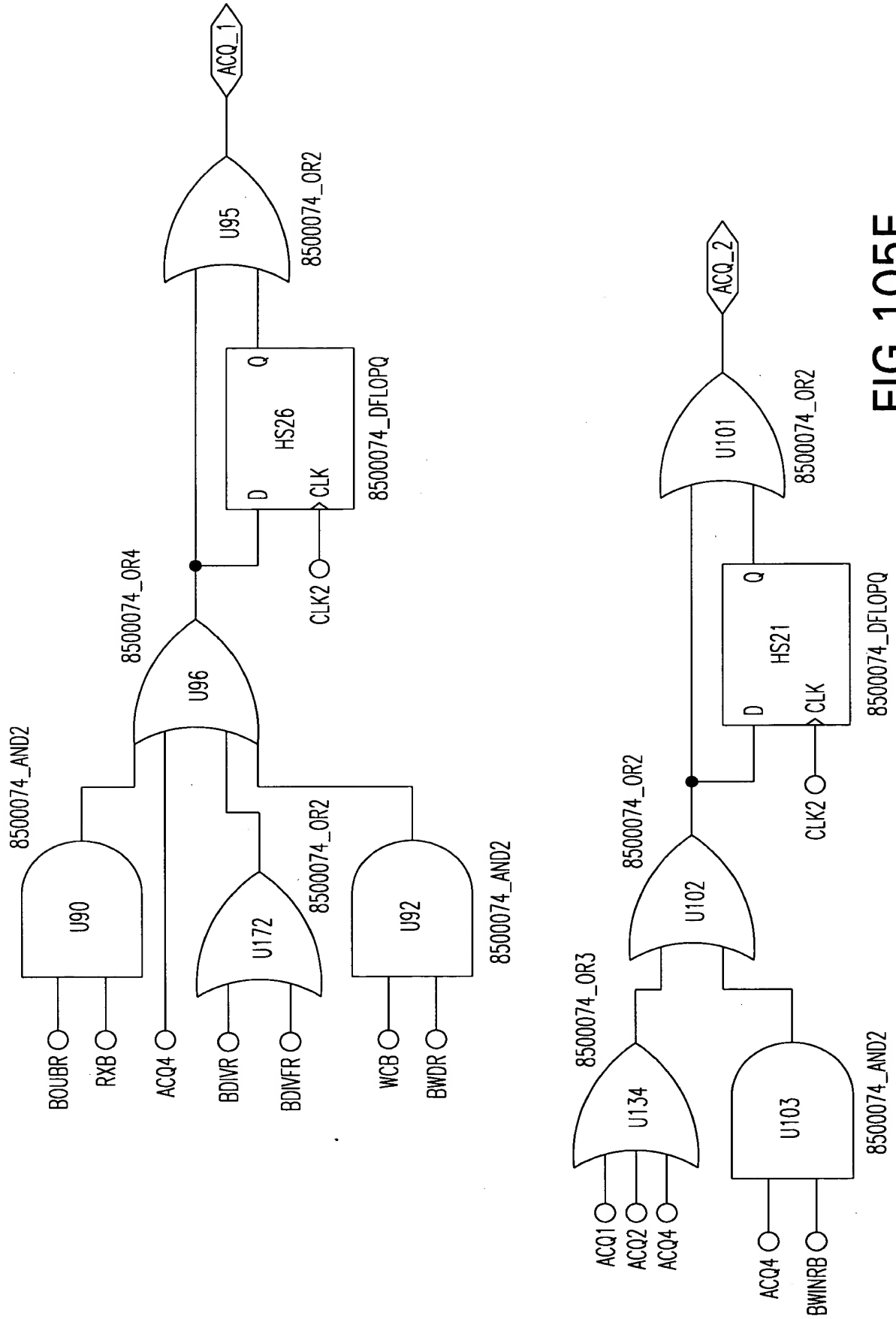


FIG. 105F

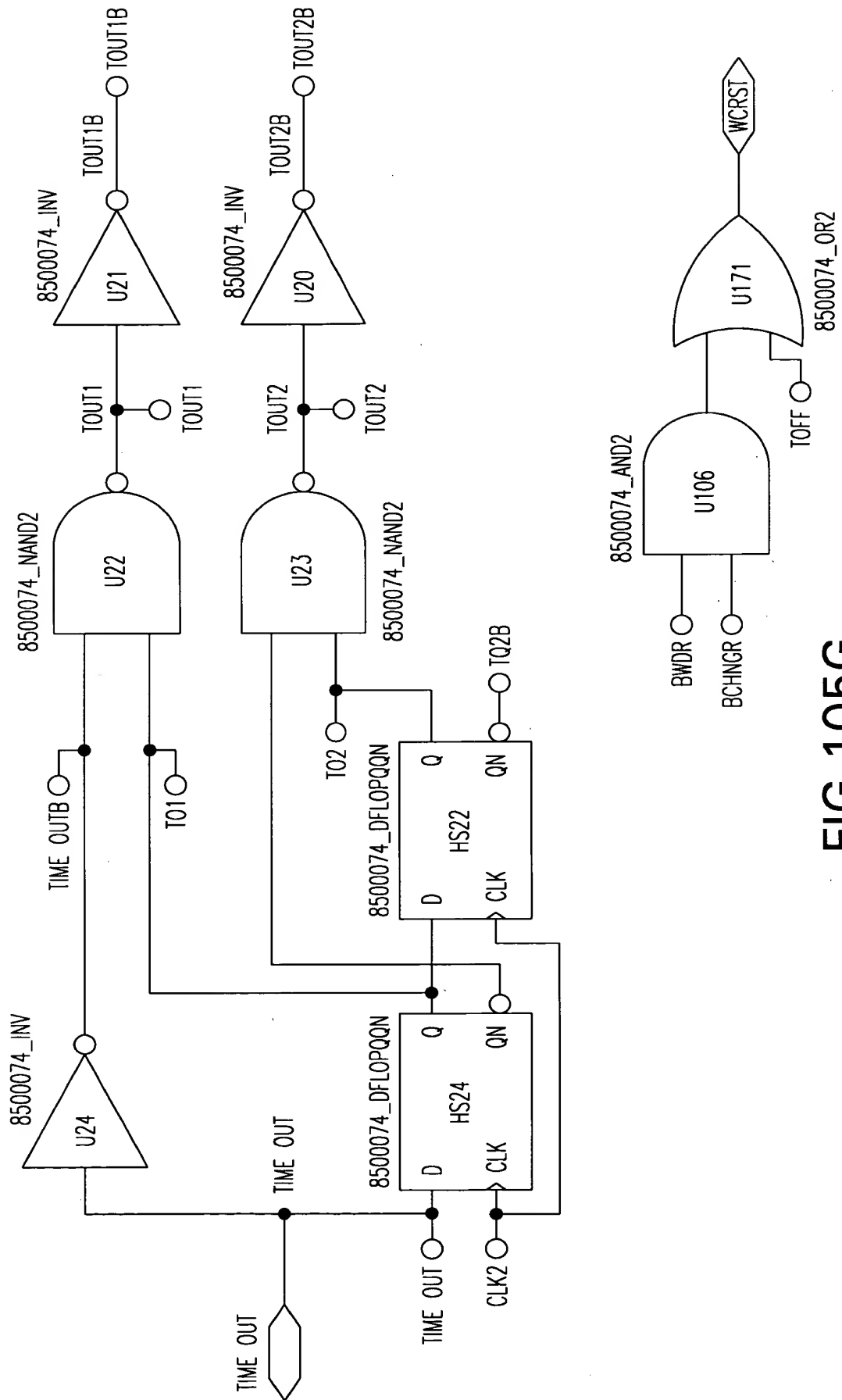


FIG. 105G

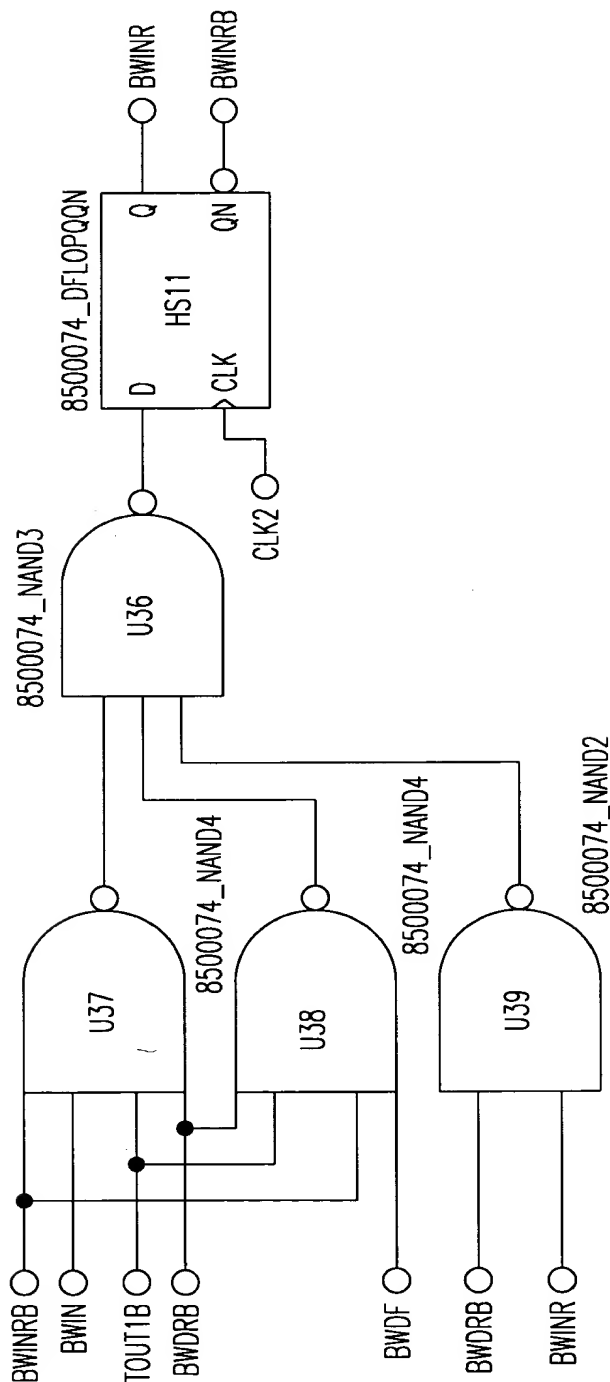


FIG. 105H



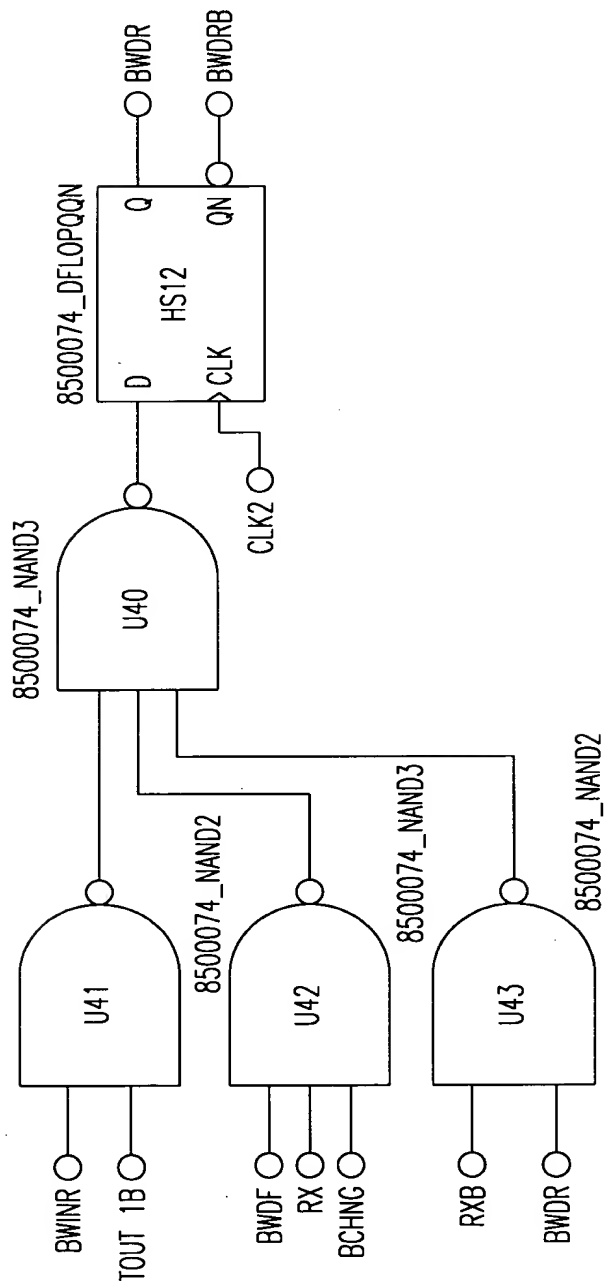


FIG. 105I

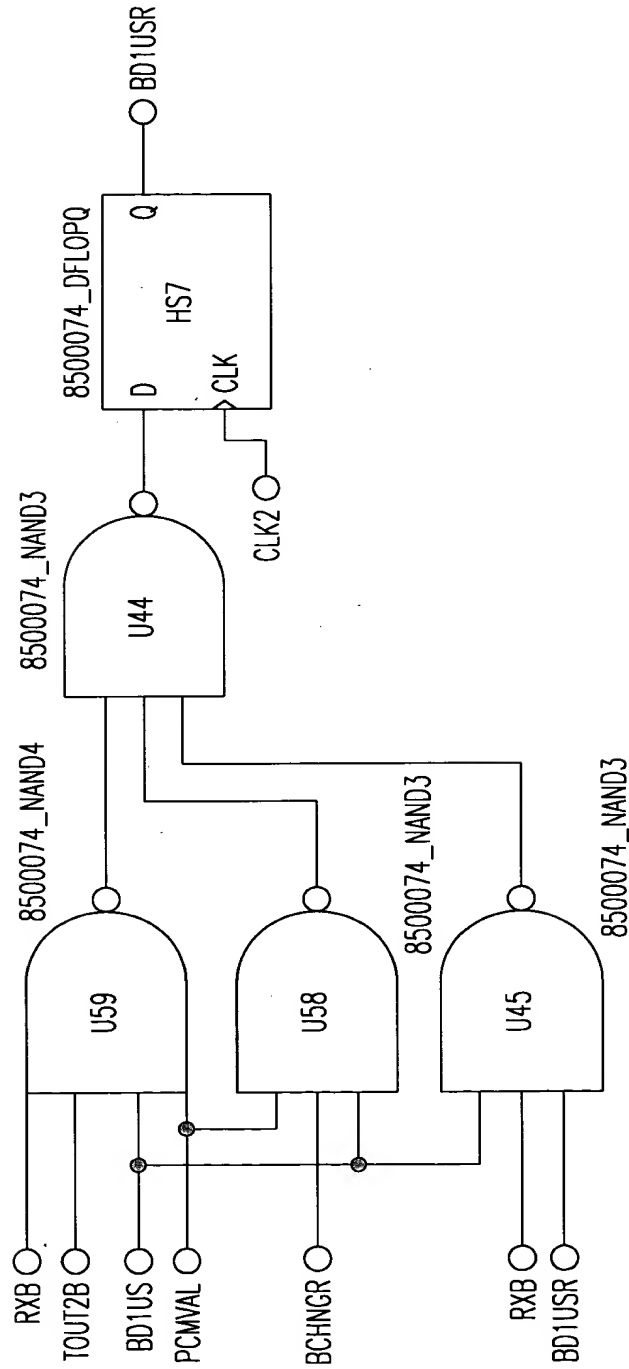


FIG. 105J

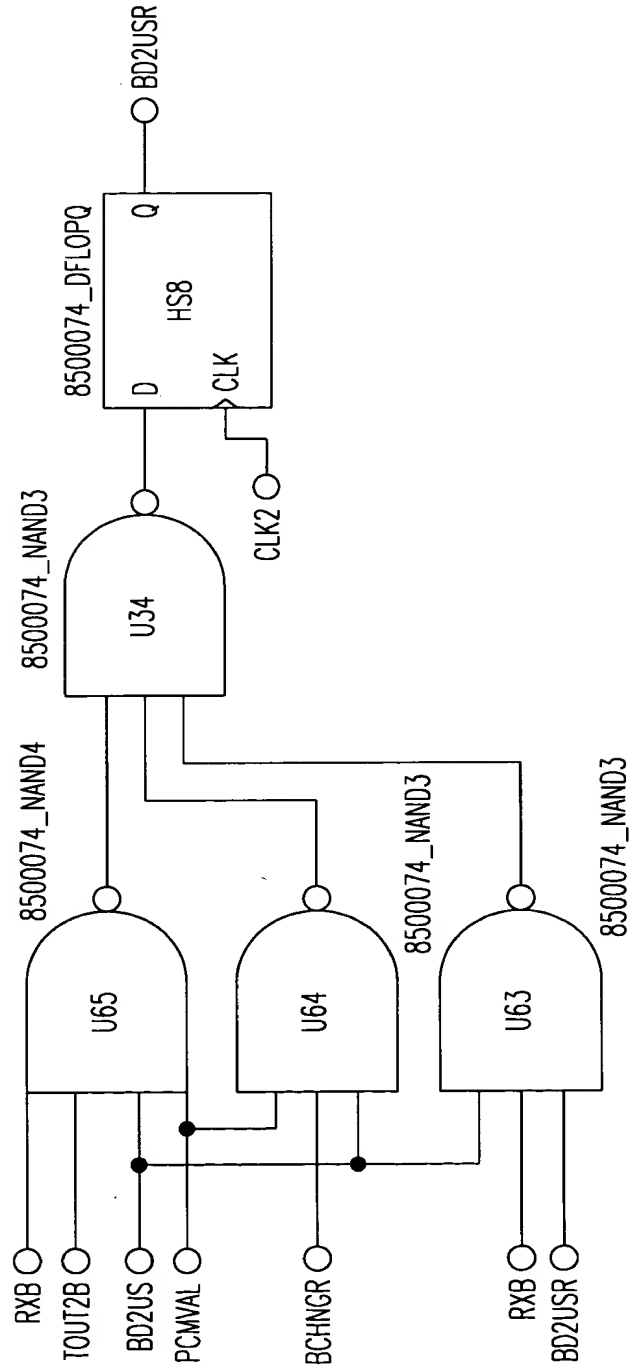


FIG. 105K

**FIG. 105L**

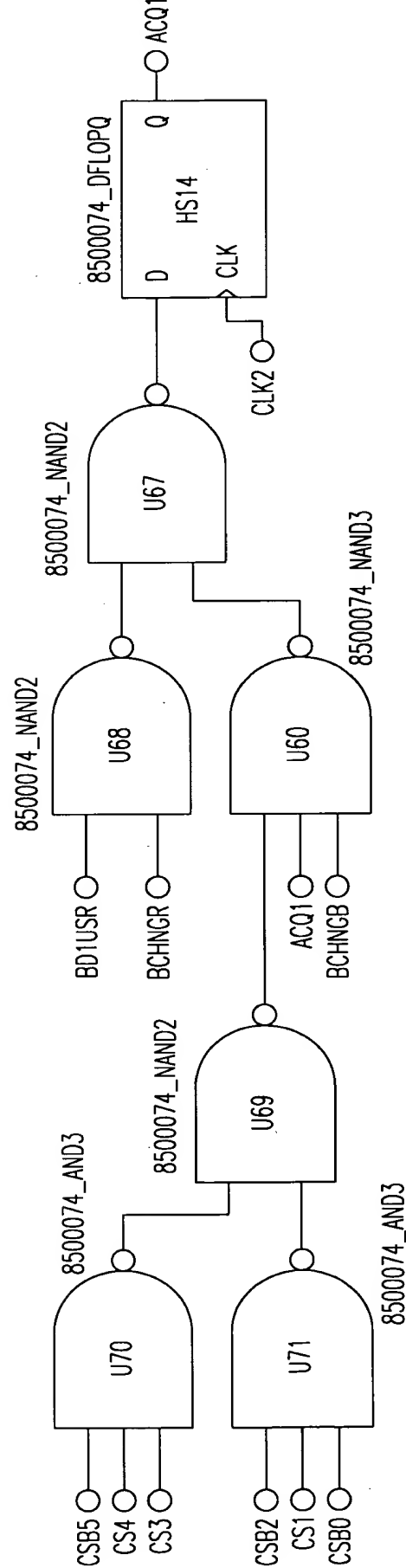


FIG. 105M

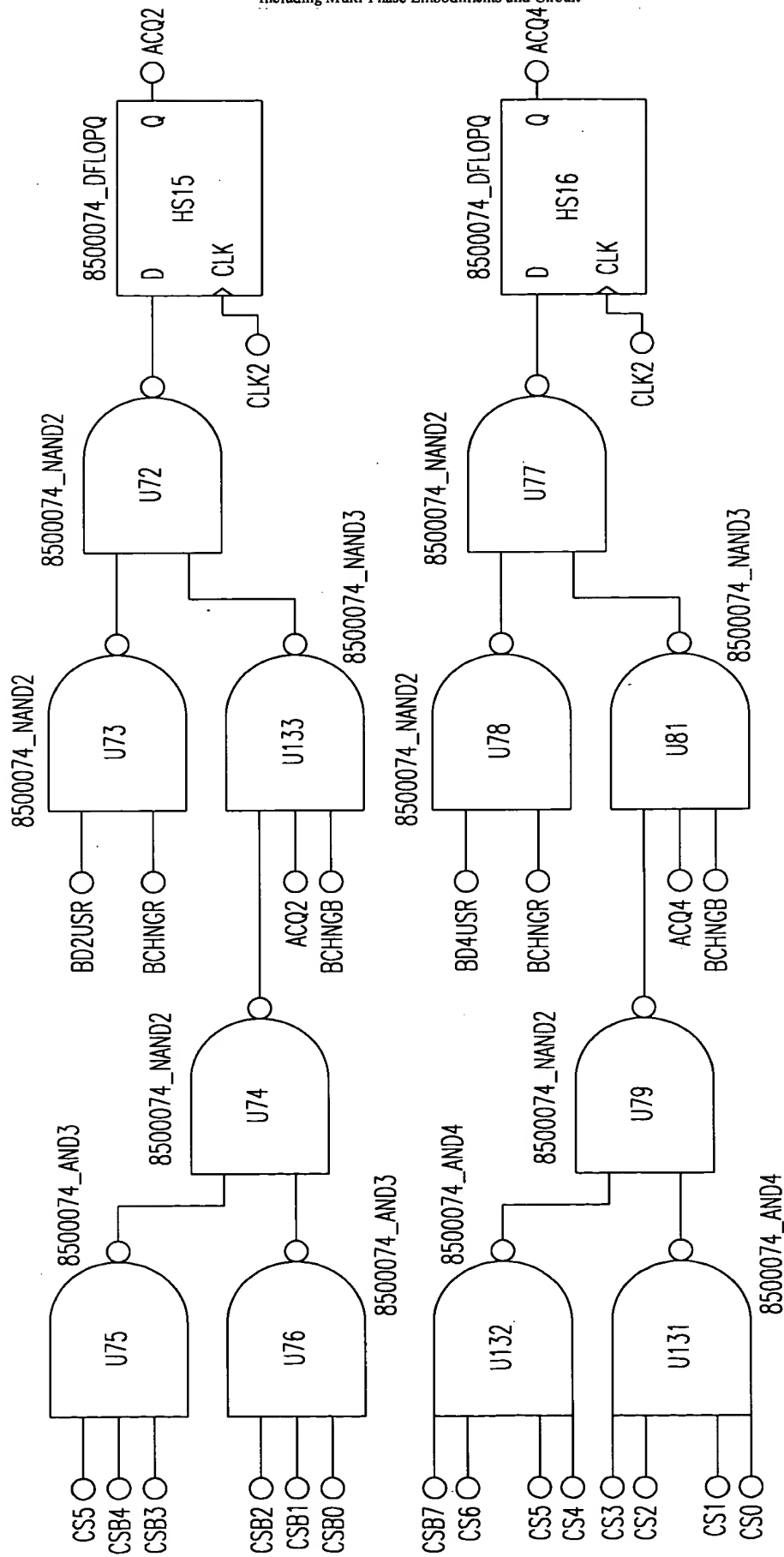


FIG. 105N

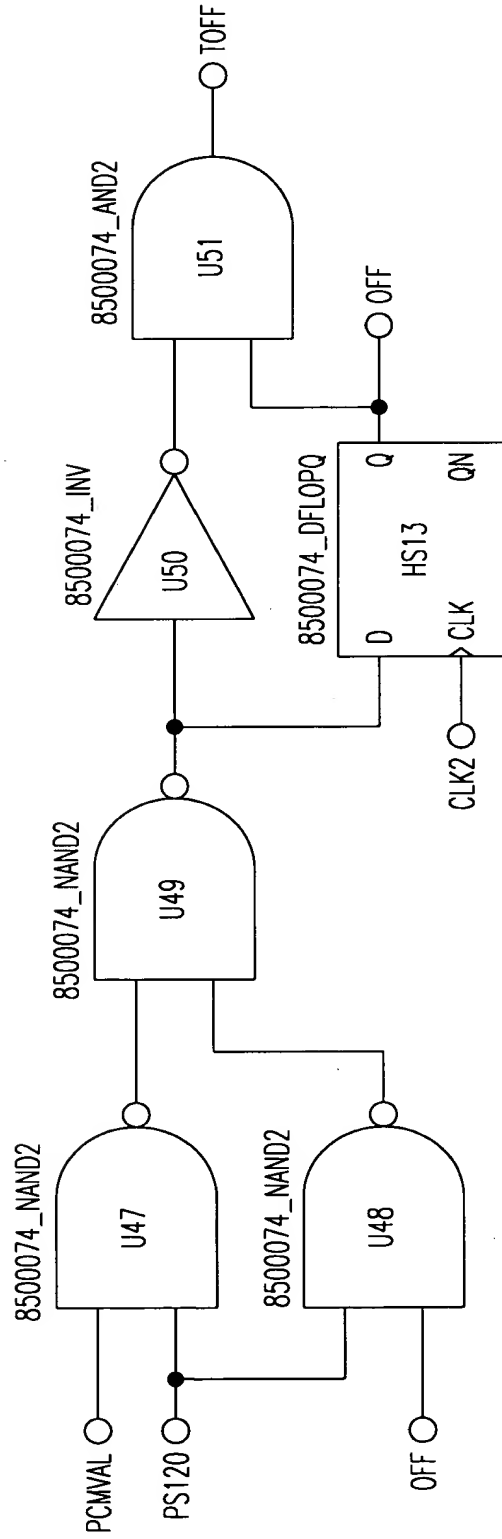


FIG. 1050

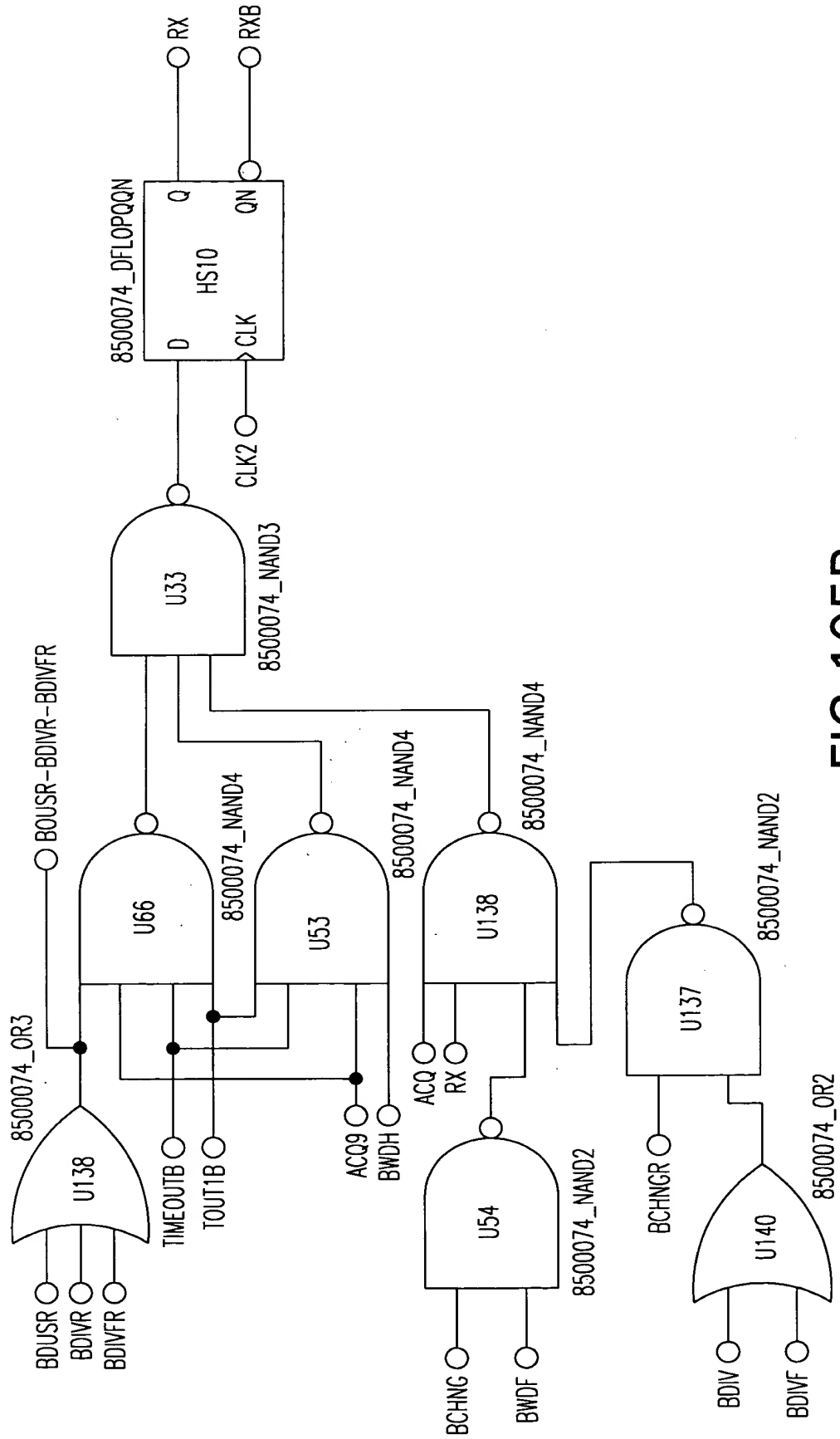


FIG. 105P



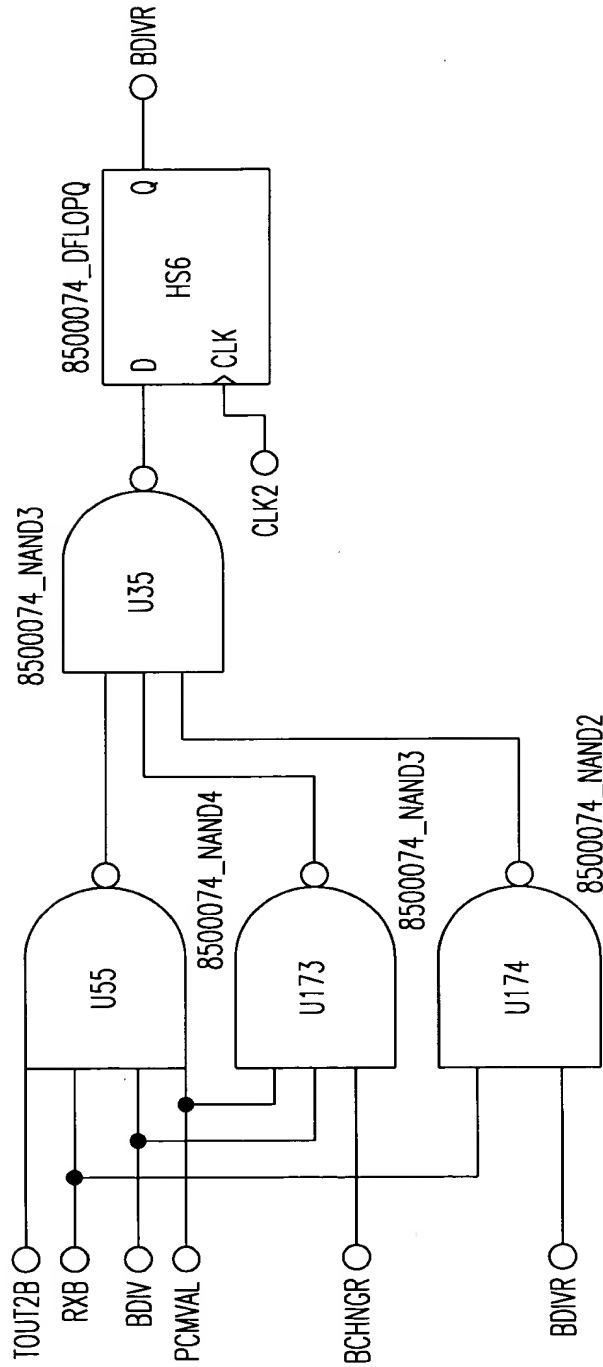


FIG. 105Q

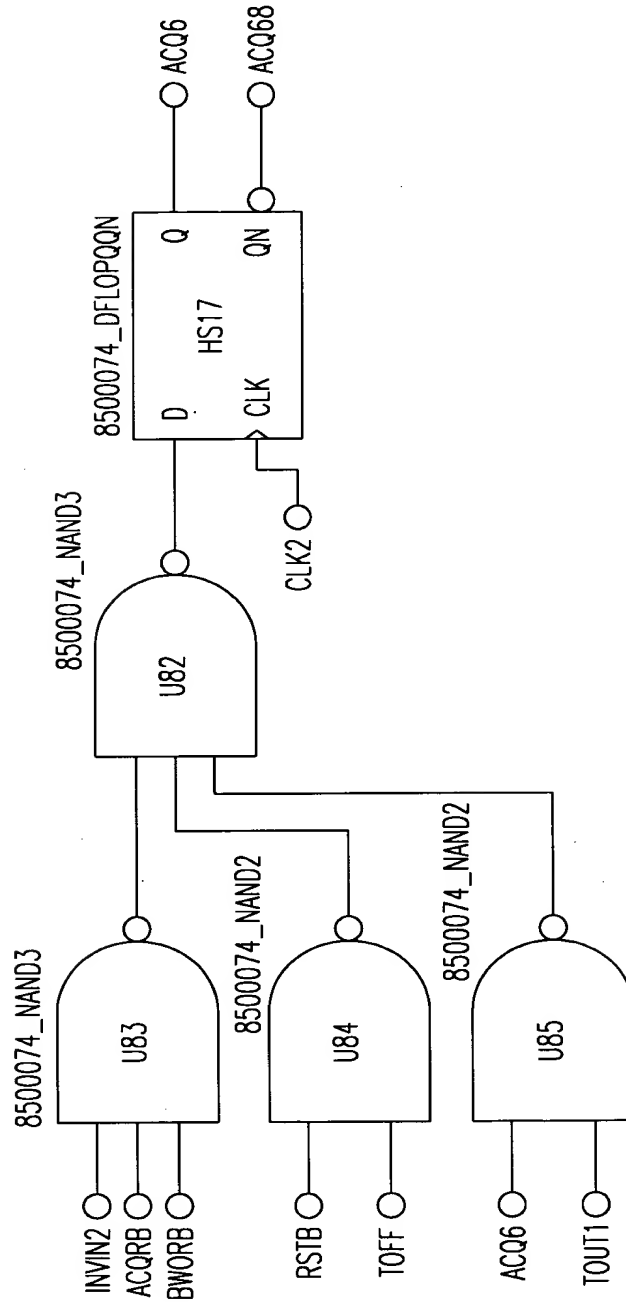


FIG. 105R

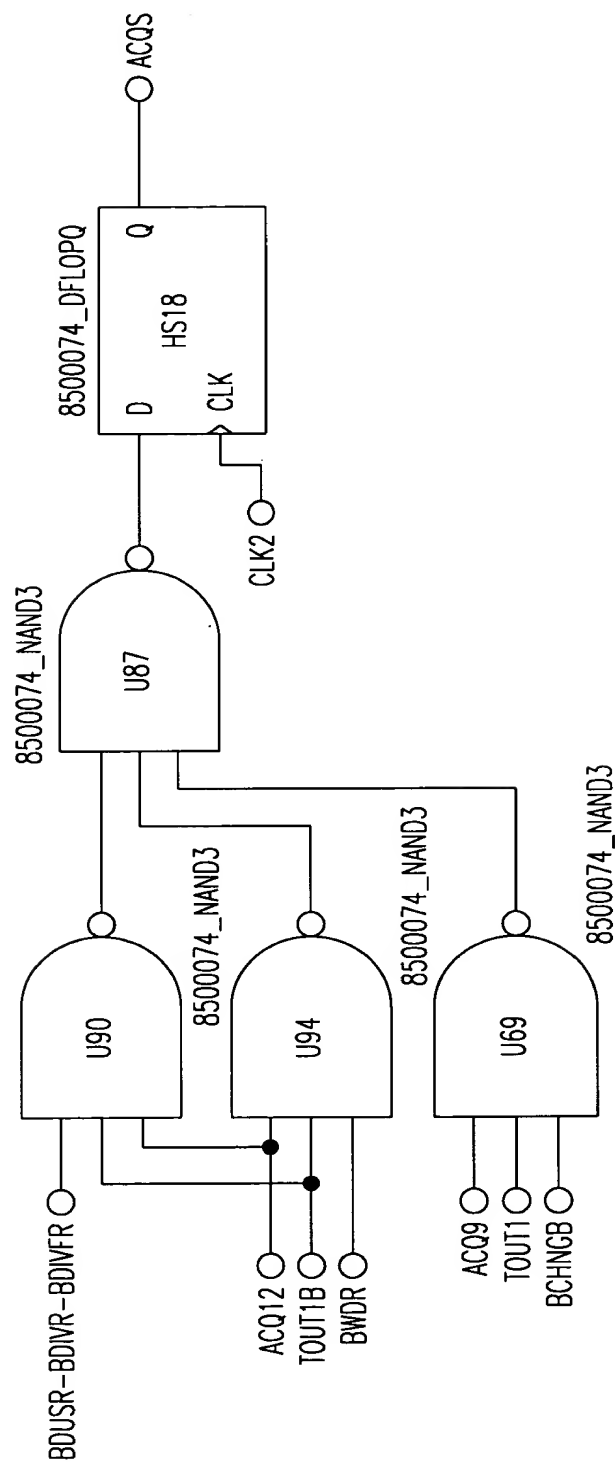
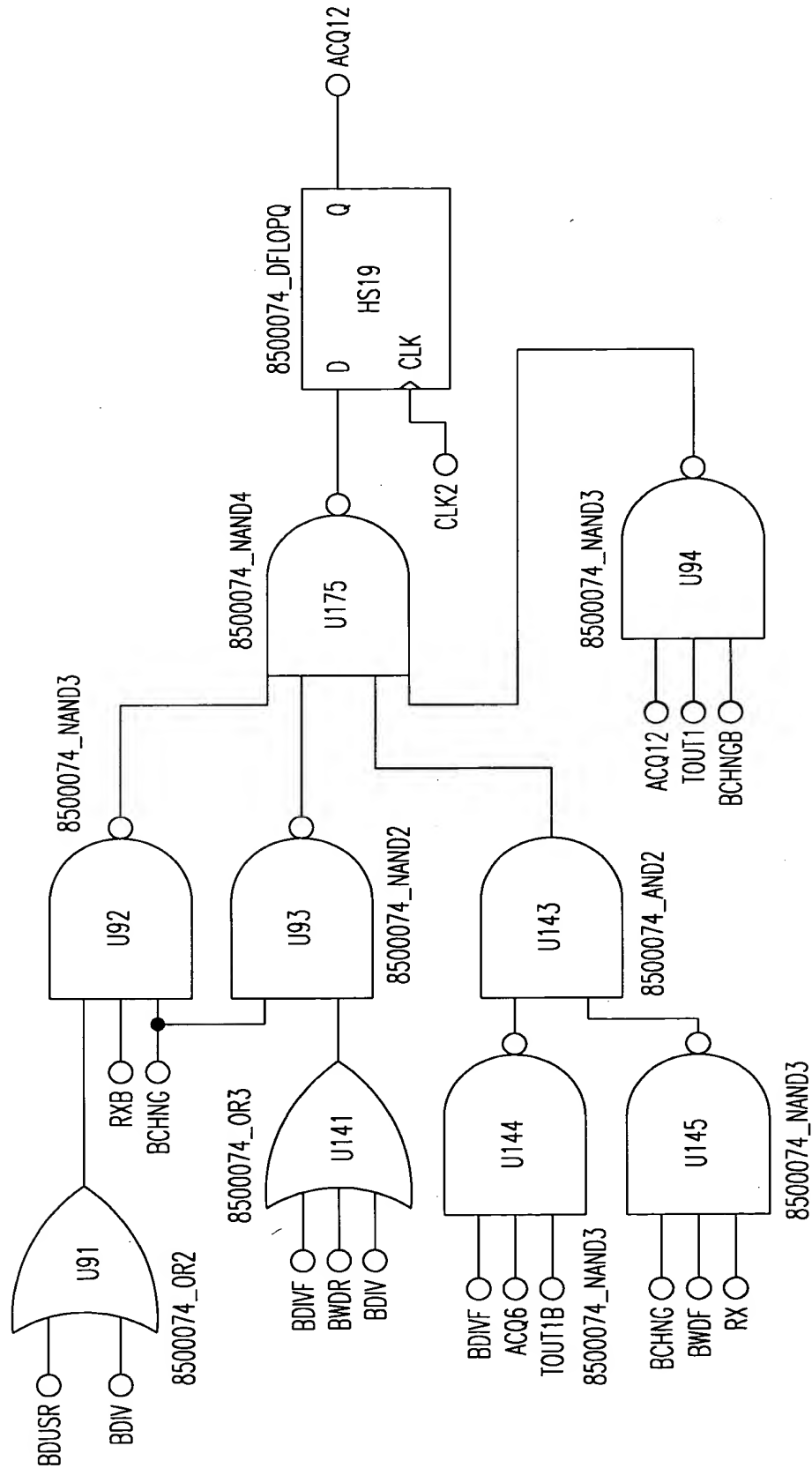


FIG. 105S



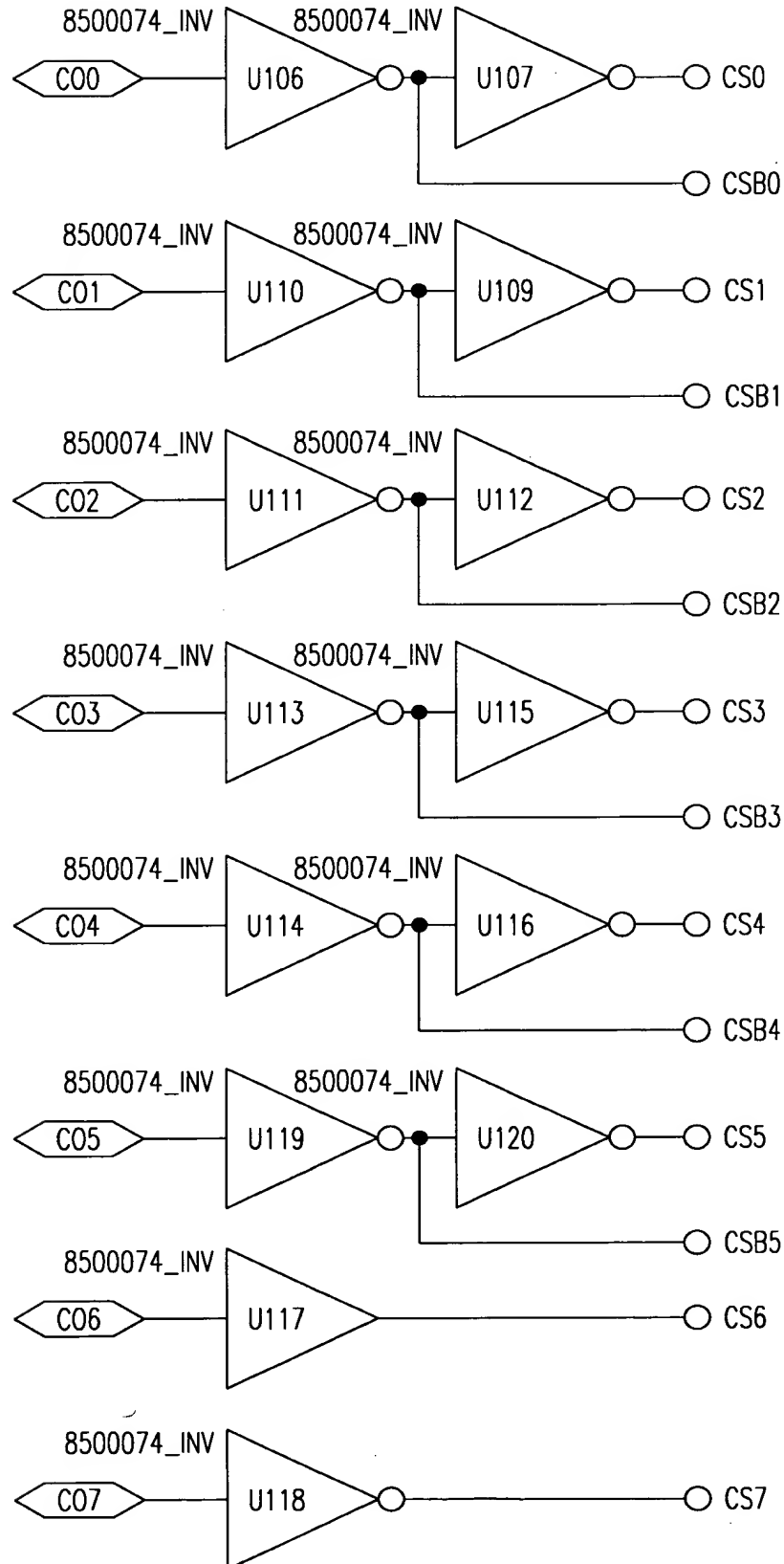


FIG.105U

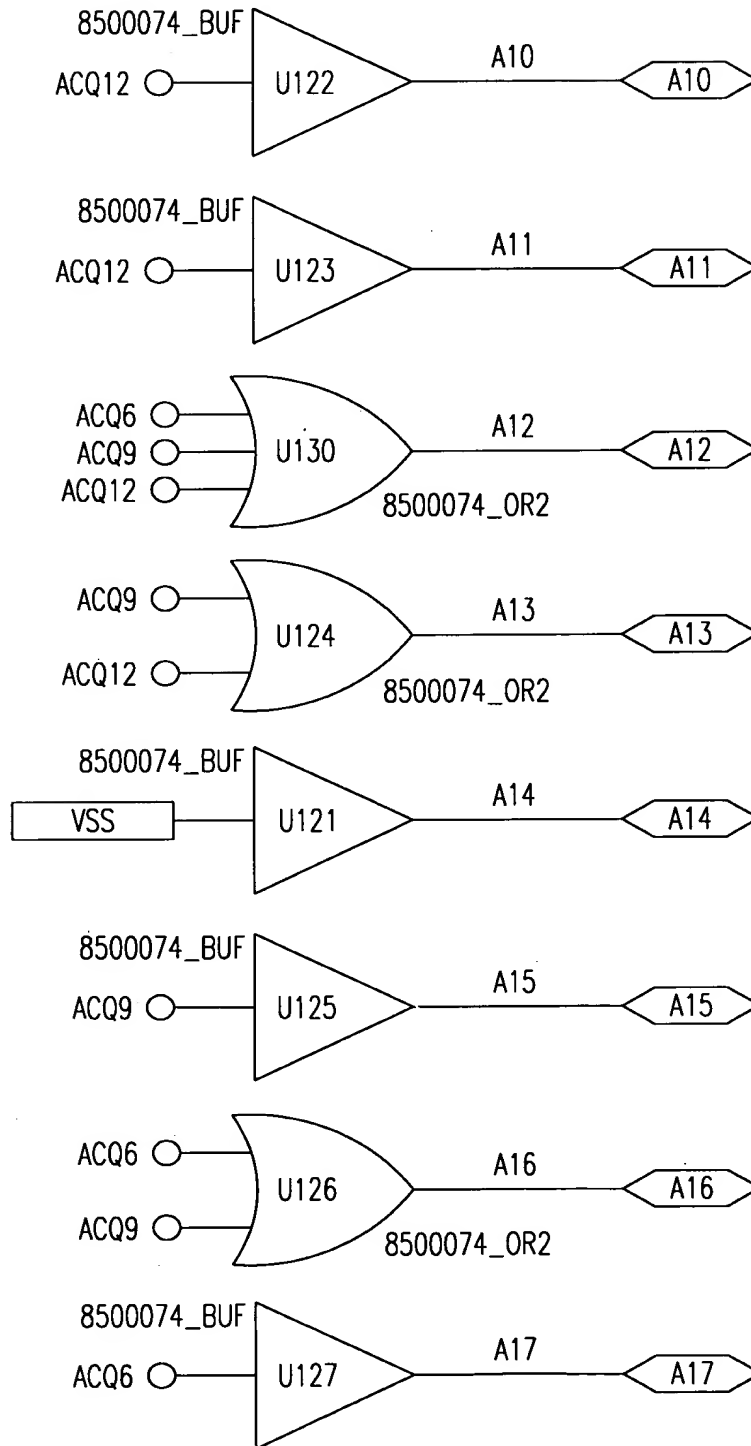


FIG. 105V

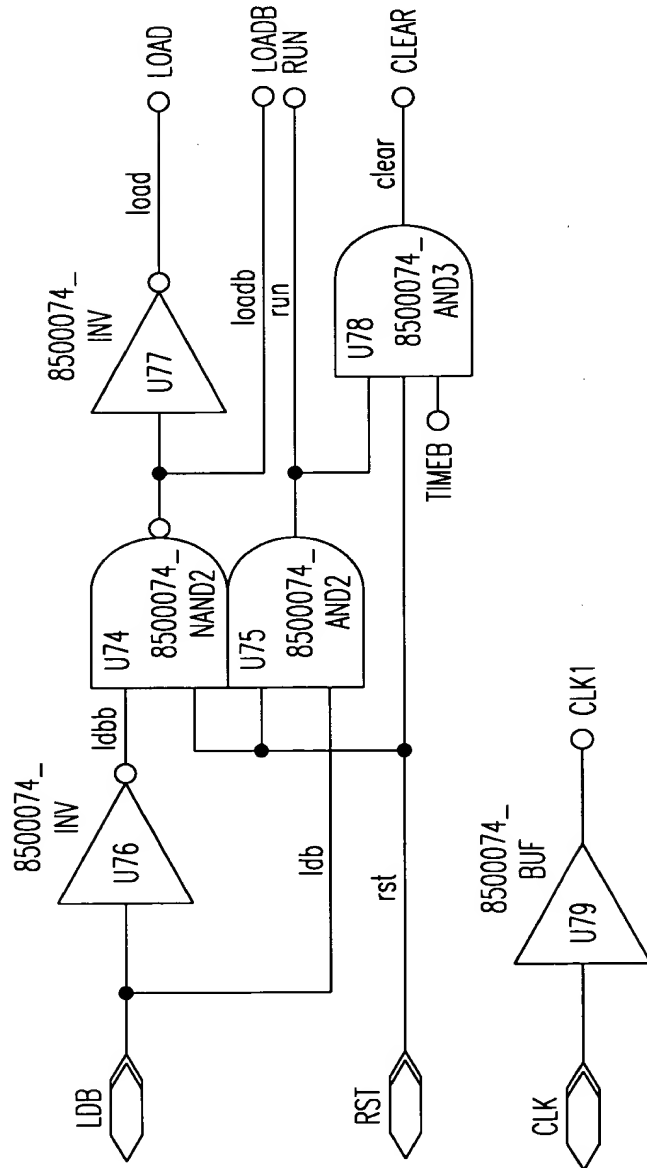


FIG. 106A

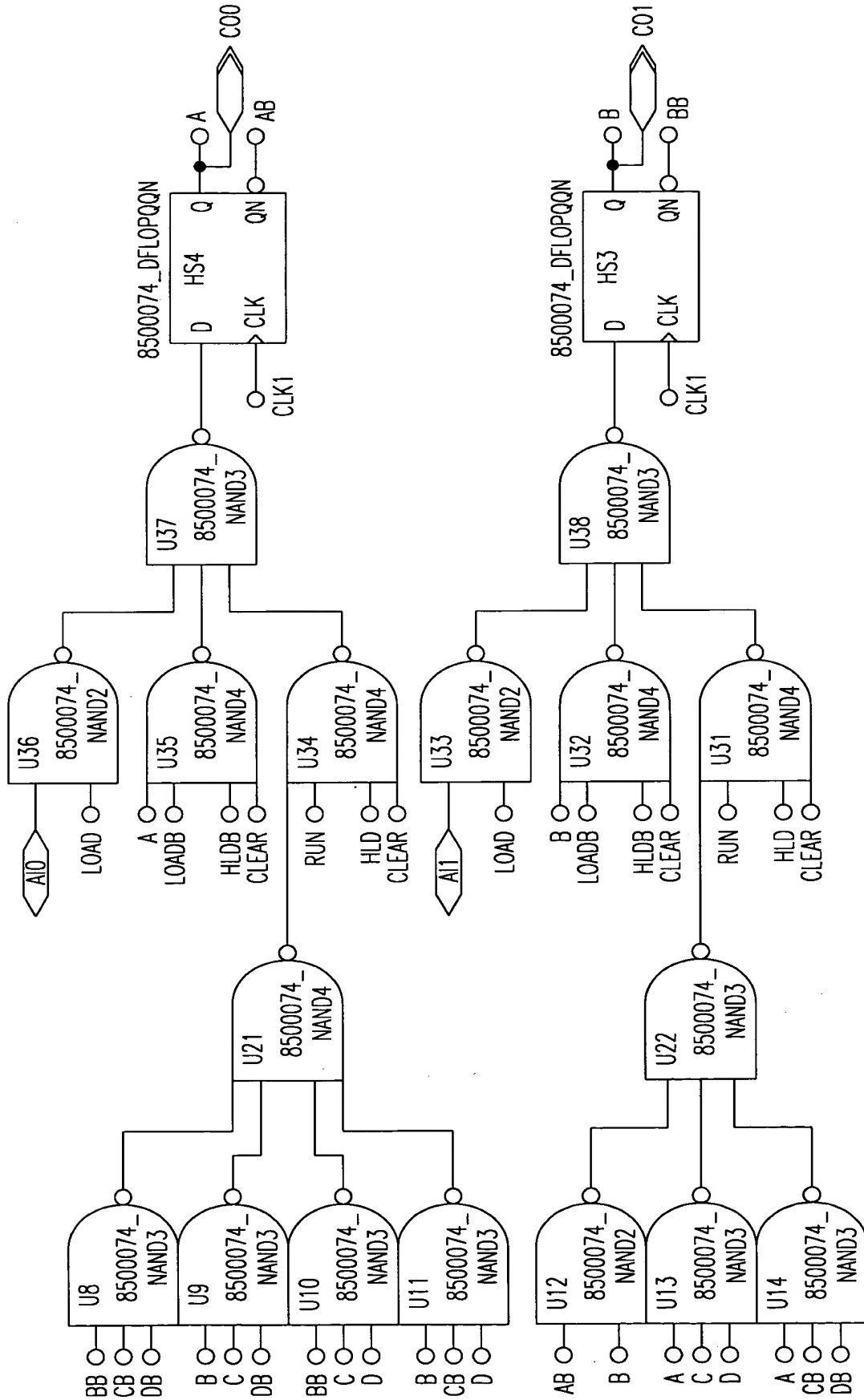


FIG. 106B



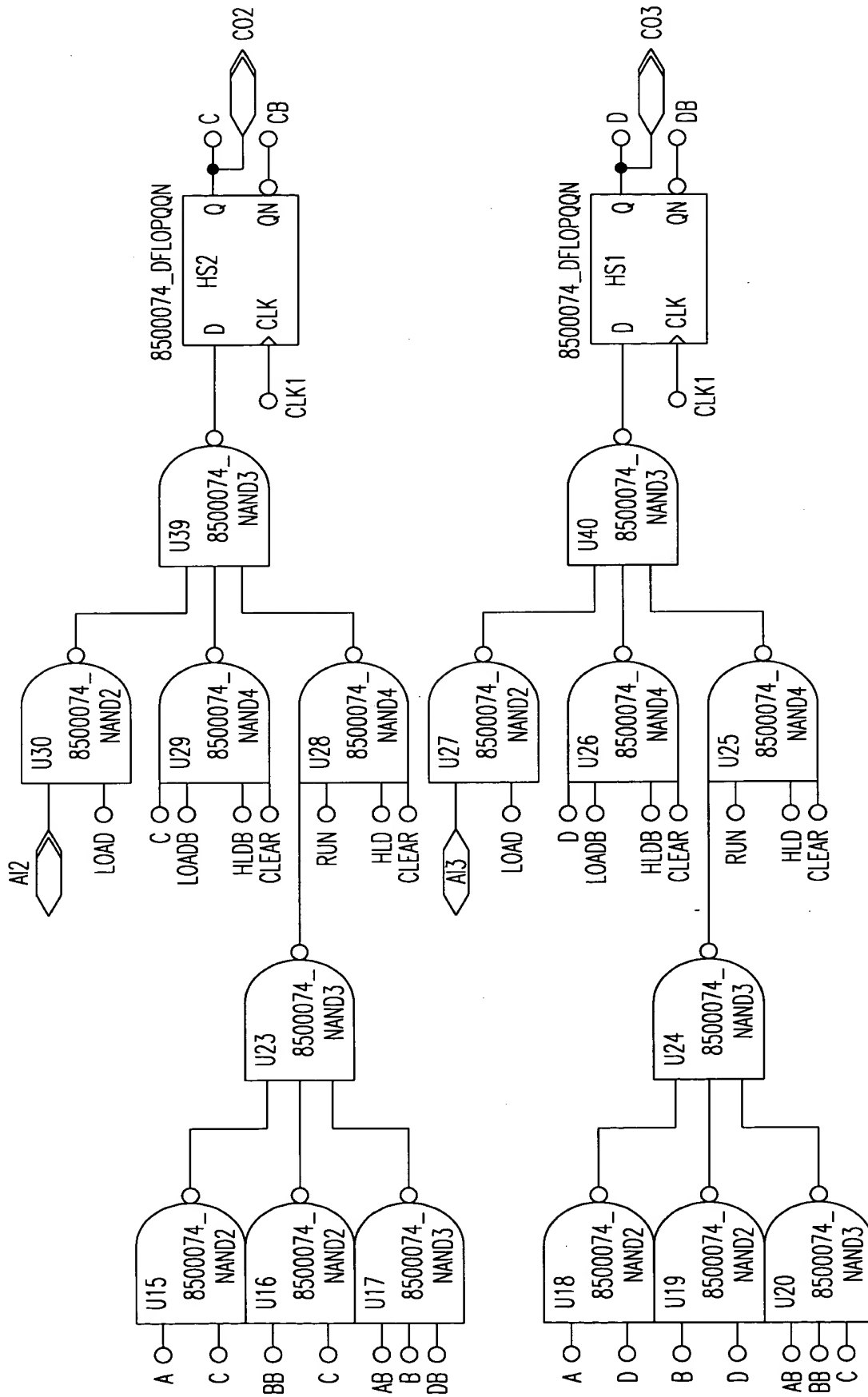


FIG. 106C

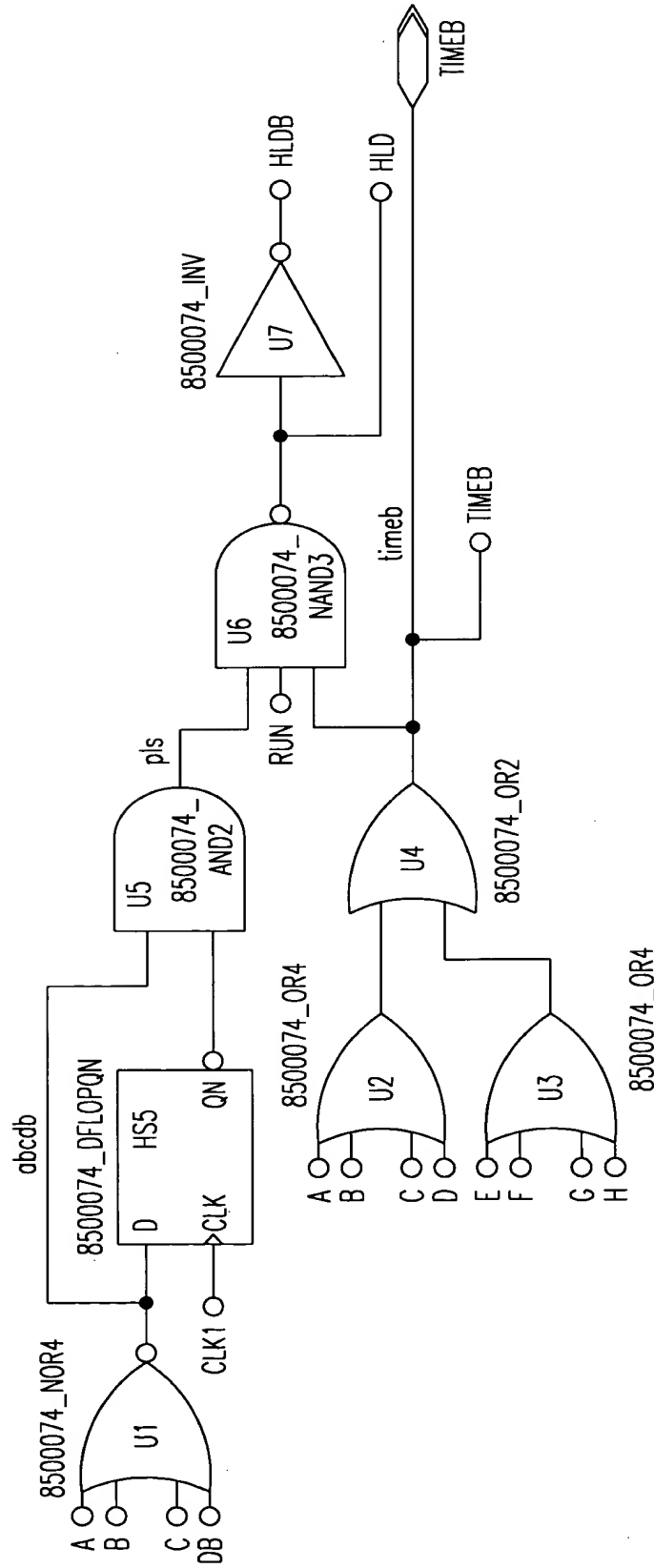


FIG. 106D

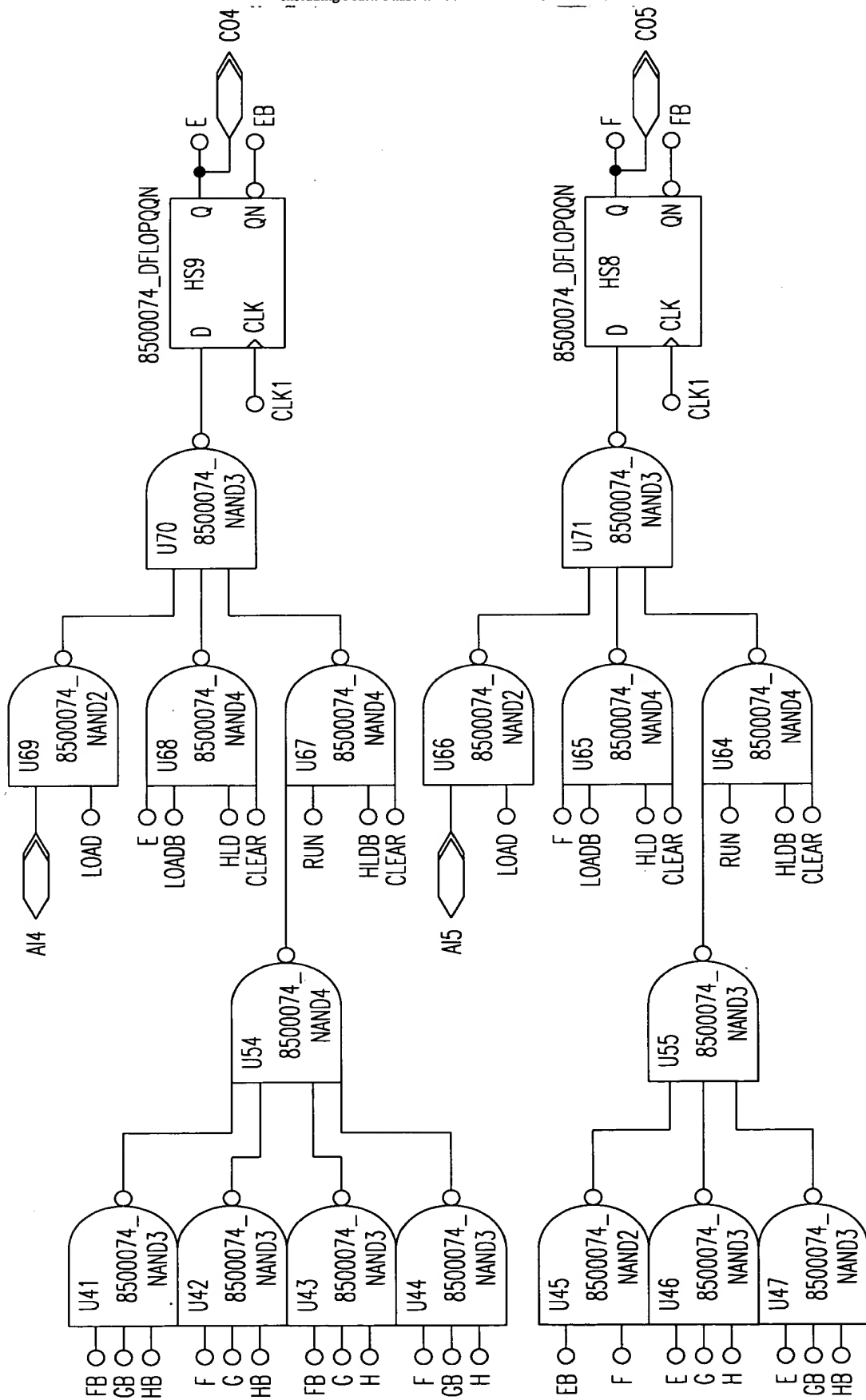


FIG. 106E

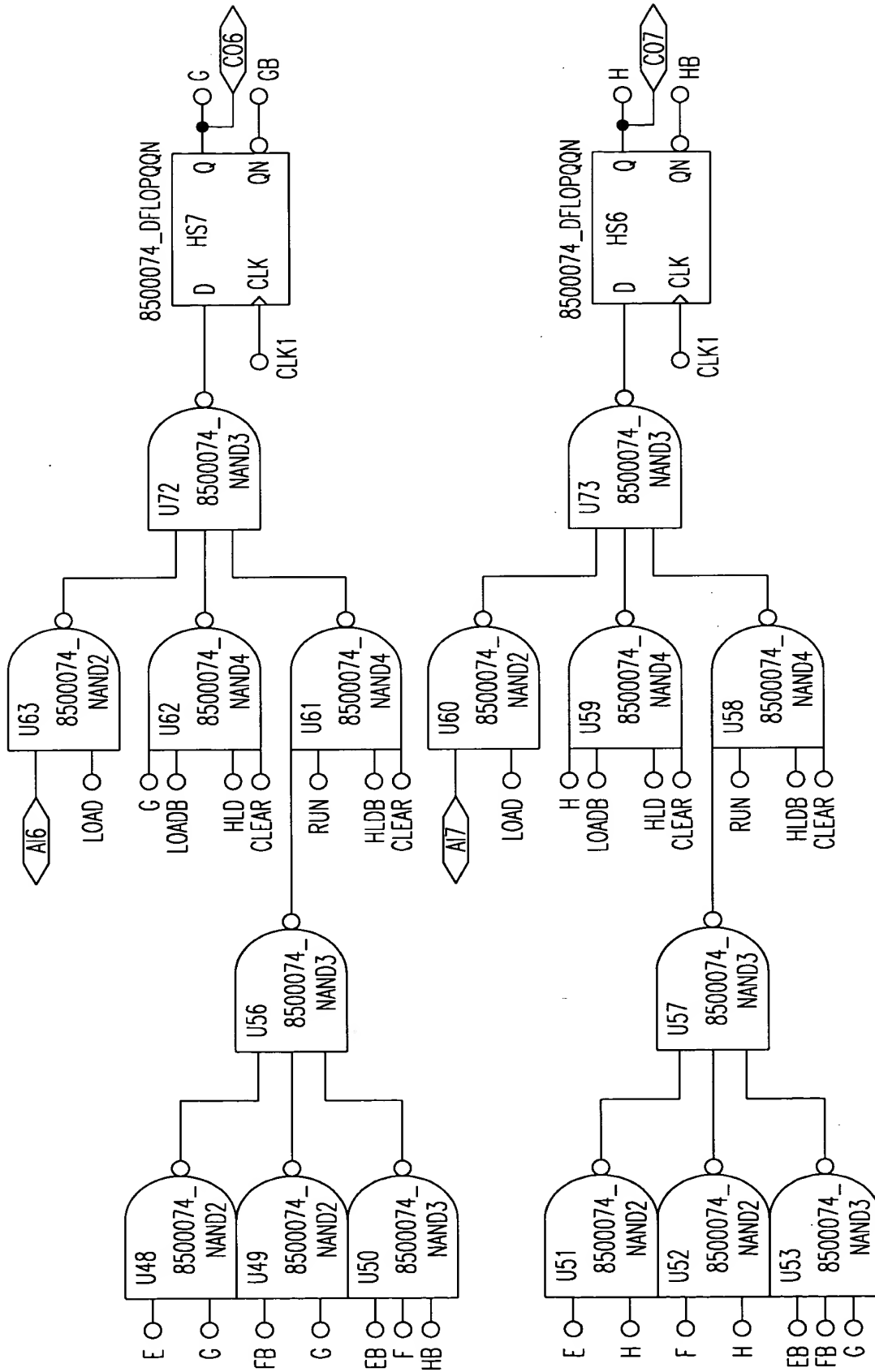
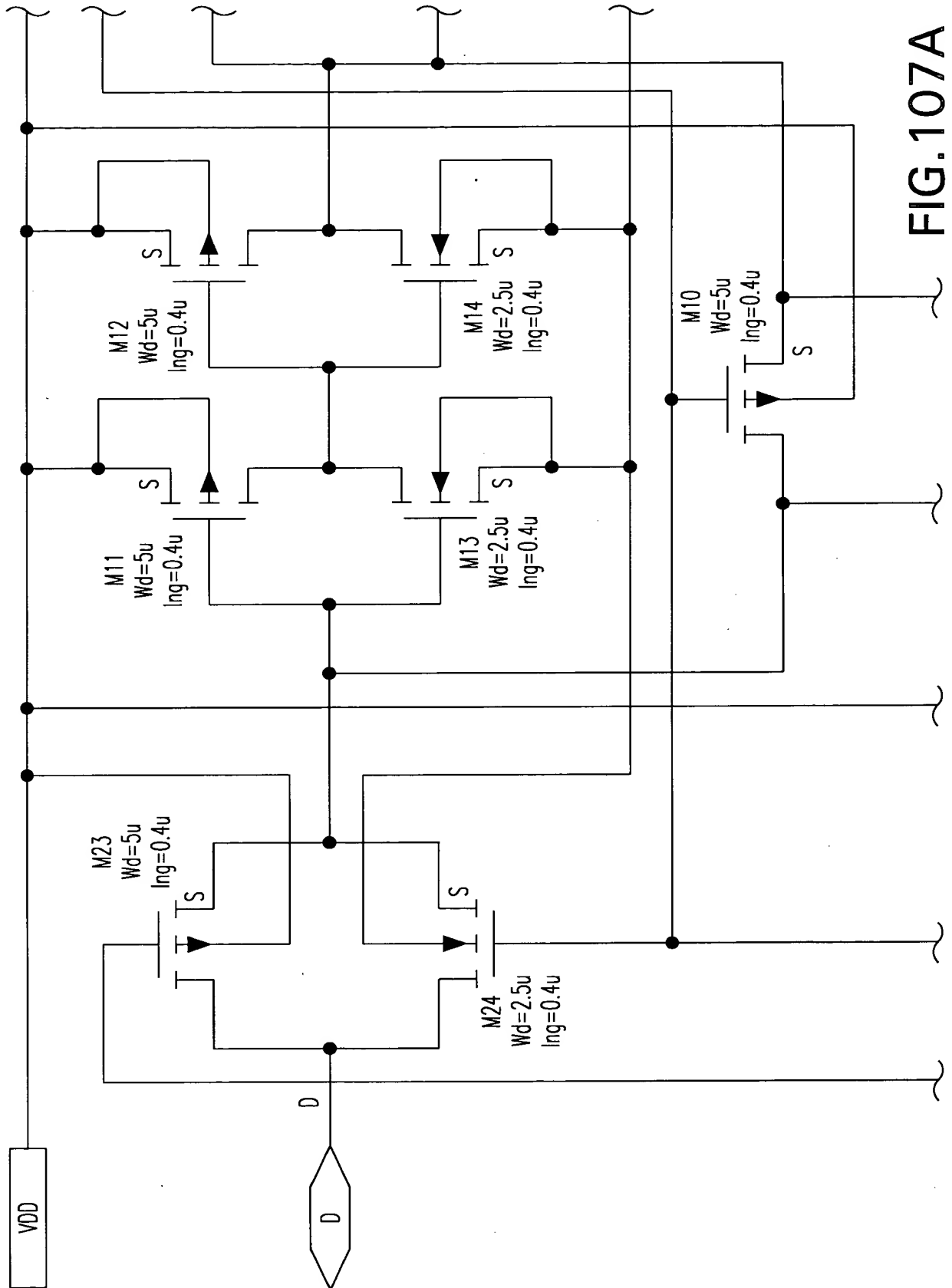


FIG. 106F



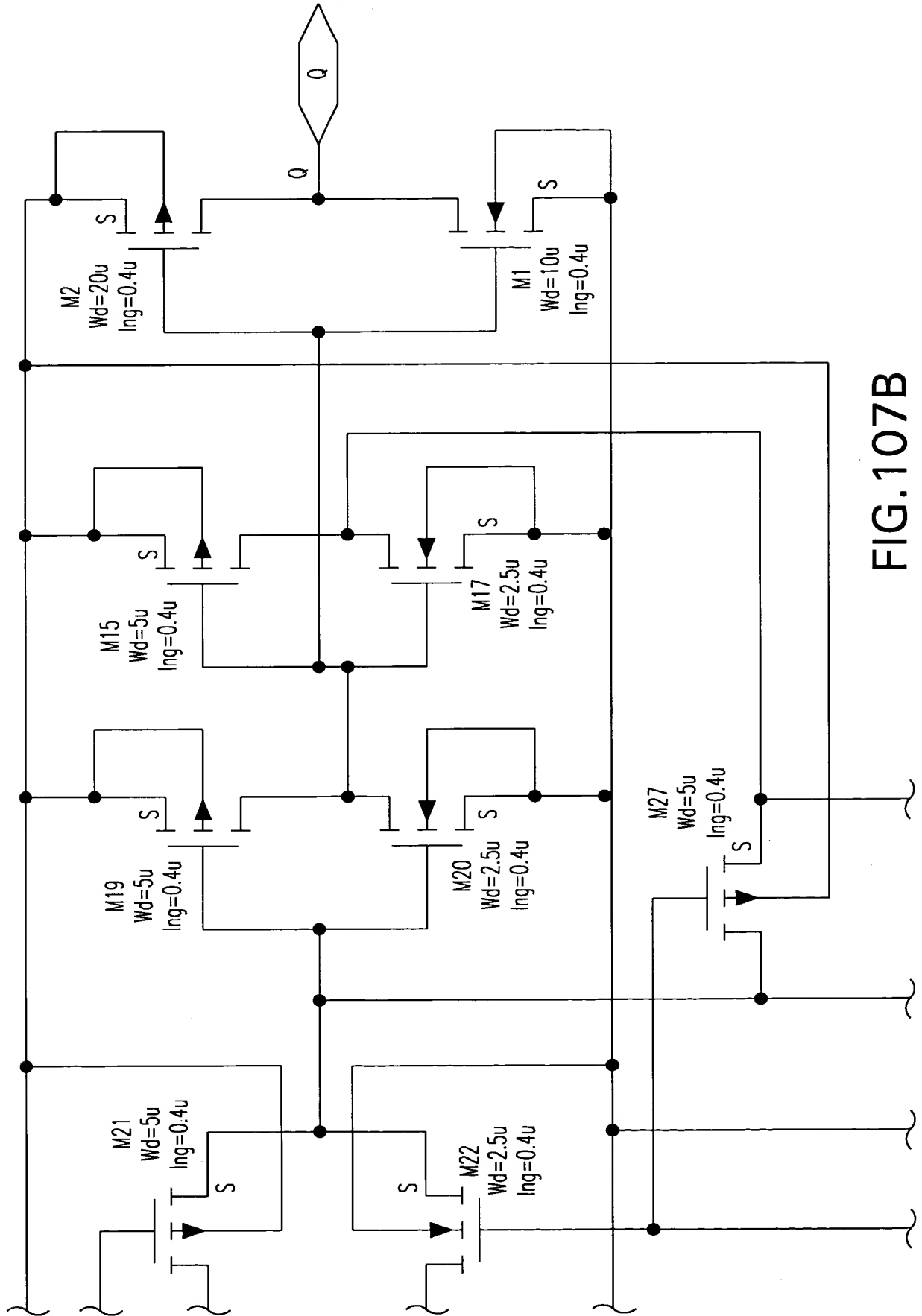
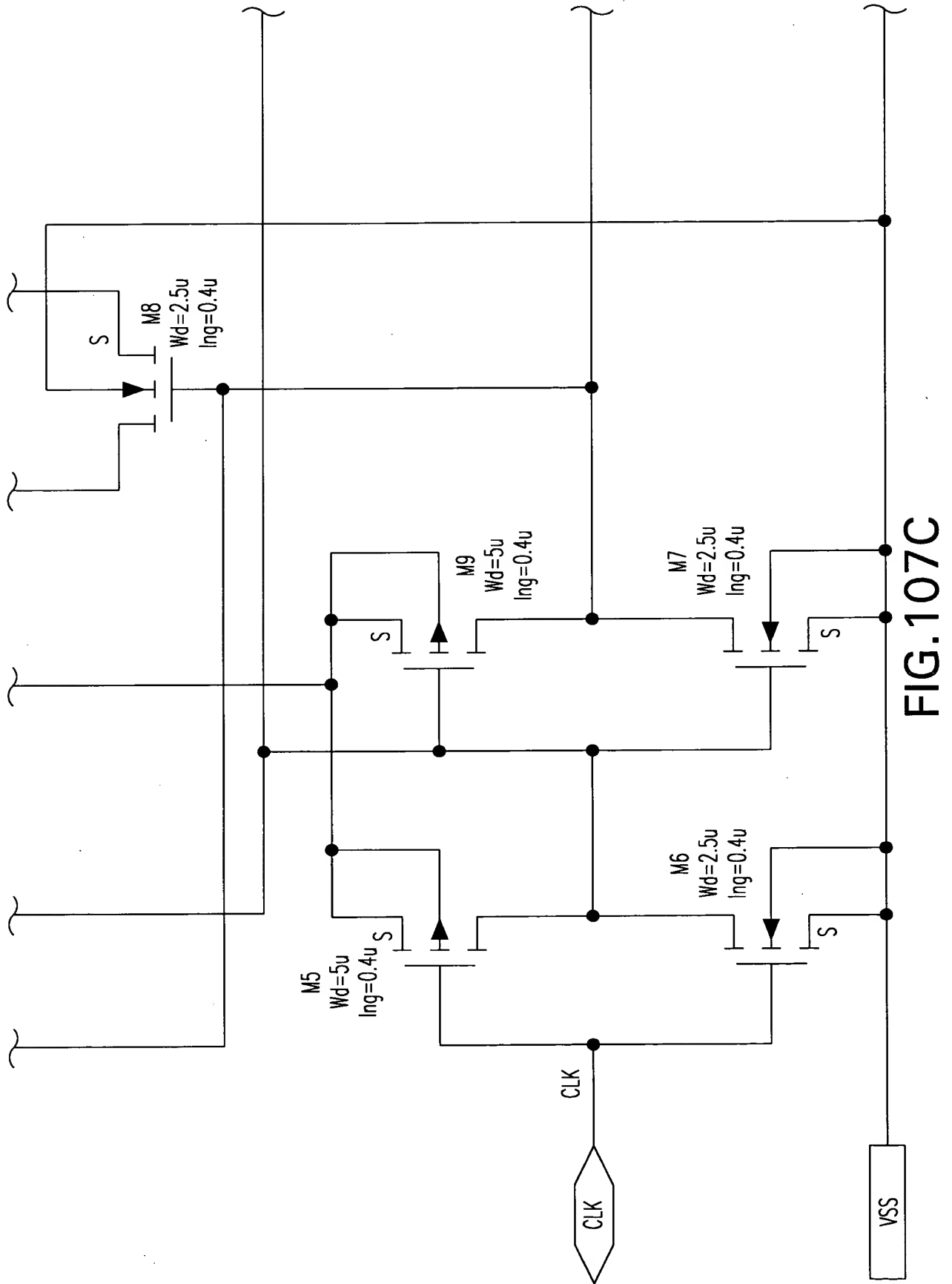


FIG. 107B



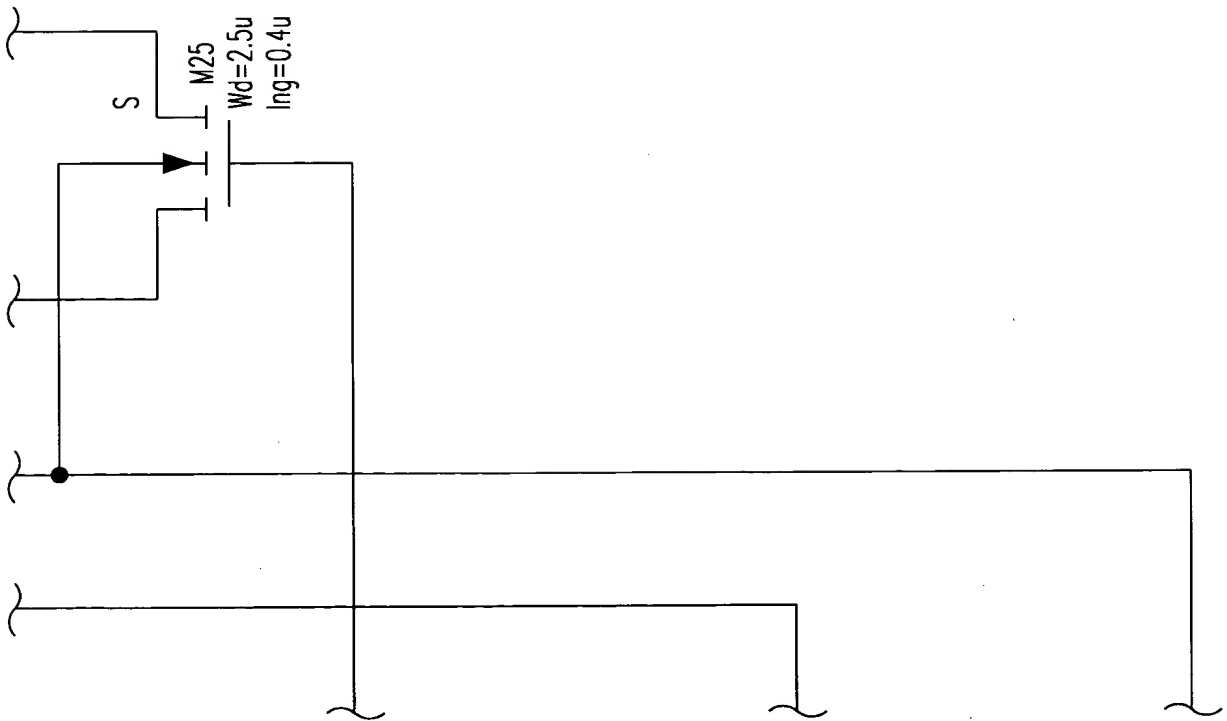


FIG.107D



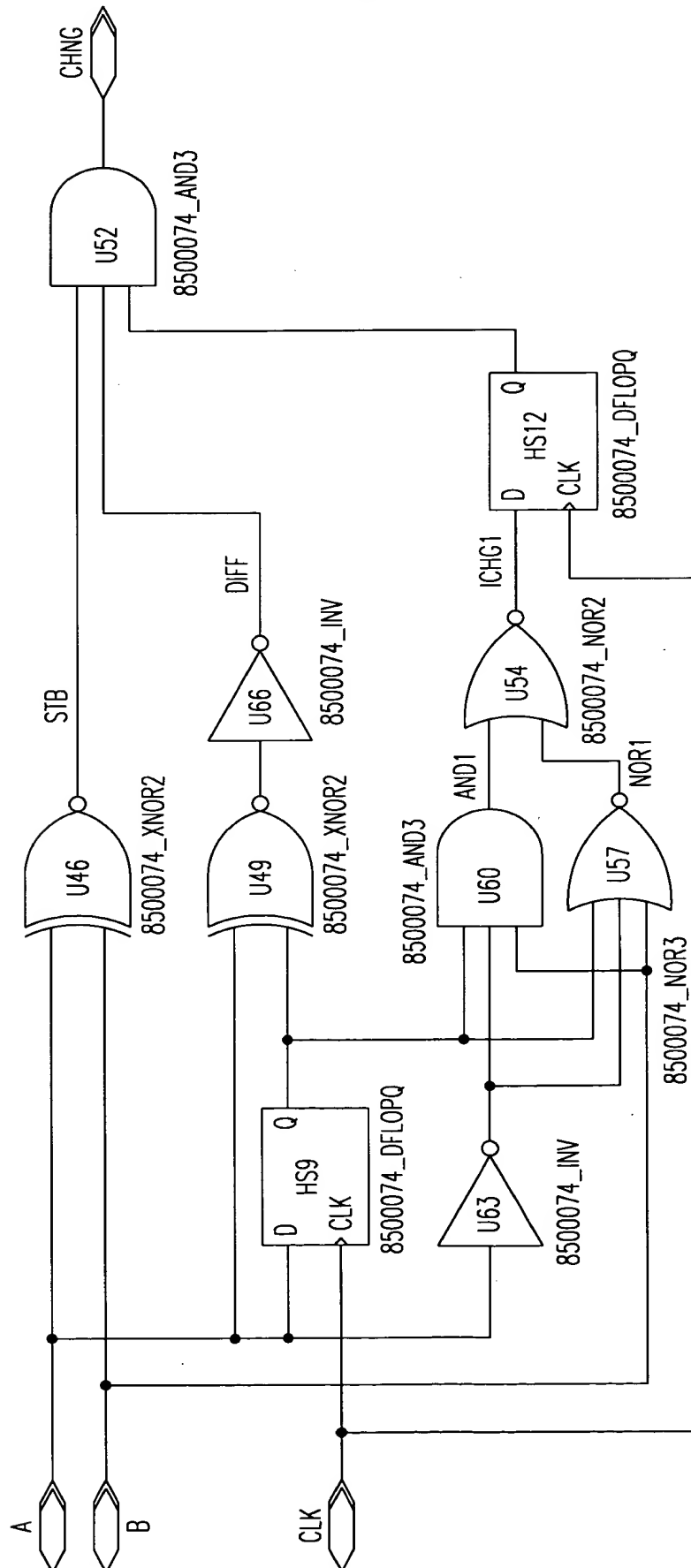


FIG. 108

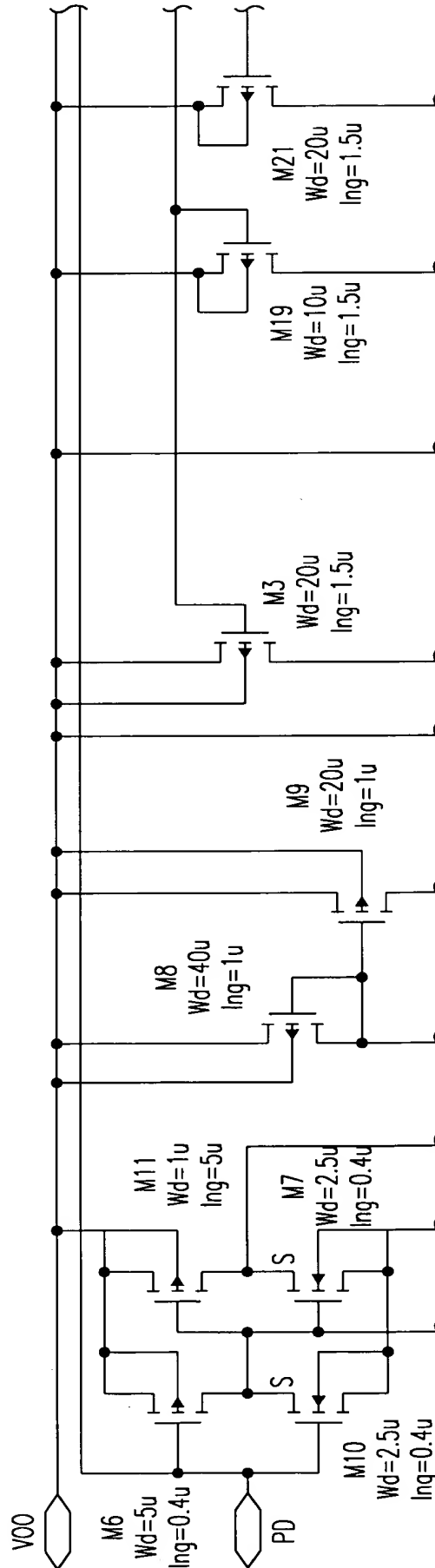


FIG. 109A

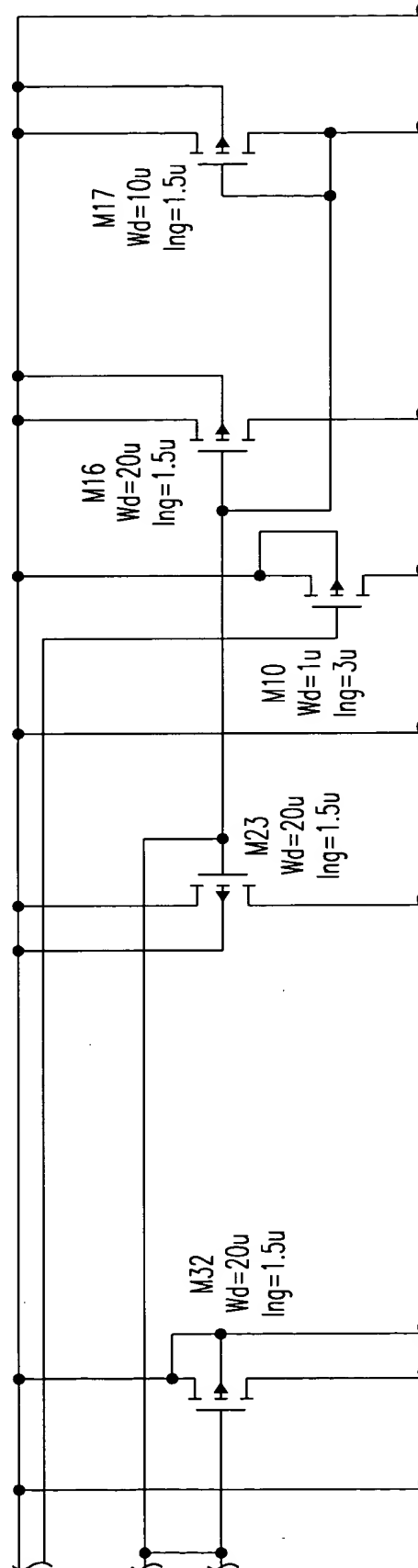


FIG. 109B

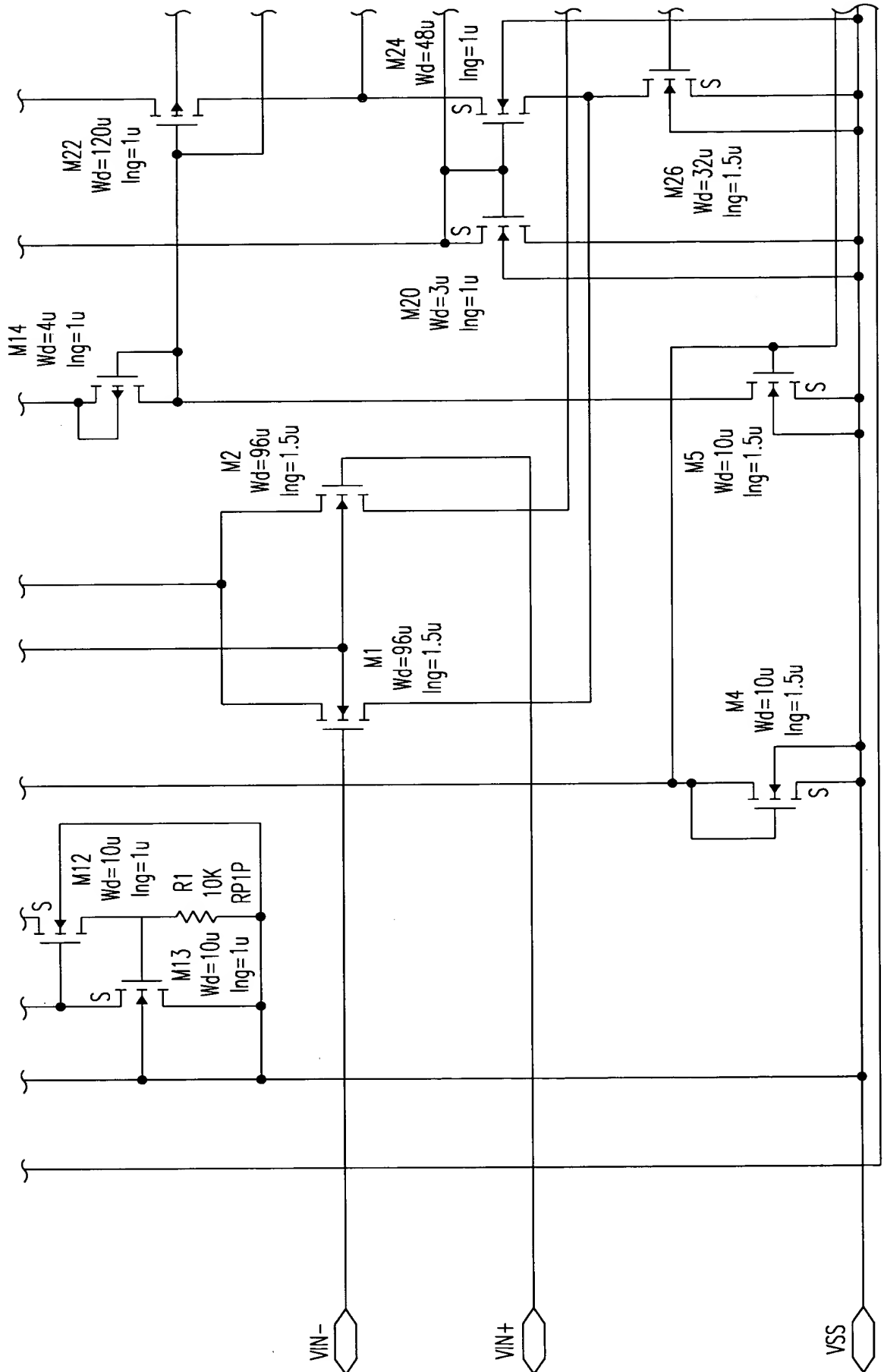


FIG. 109C

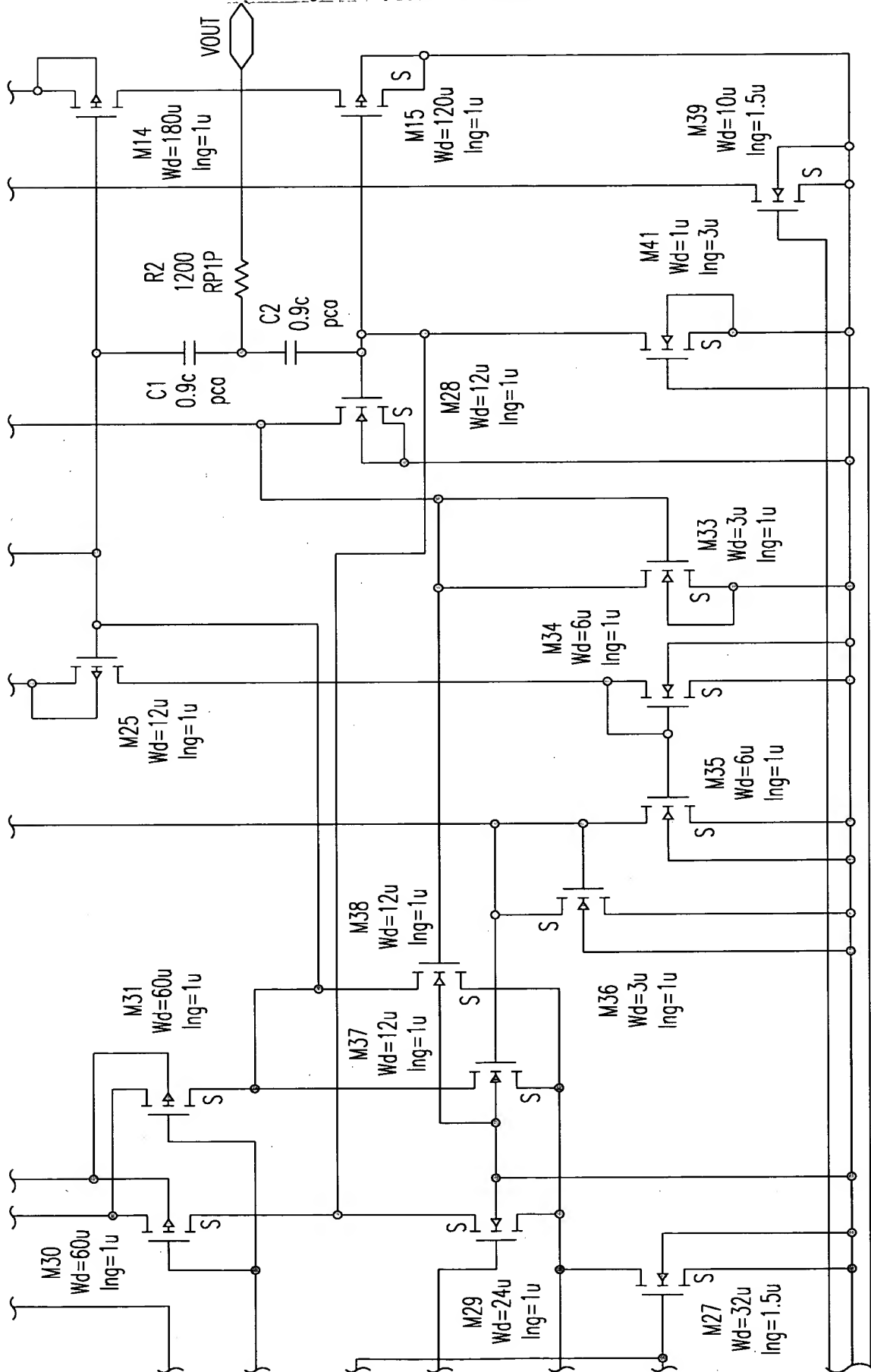


FIG. 109D

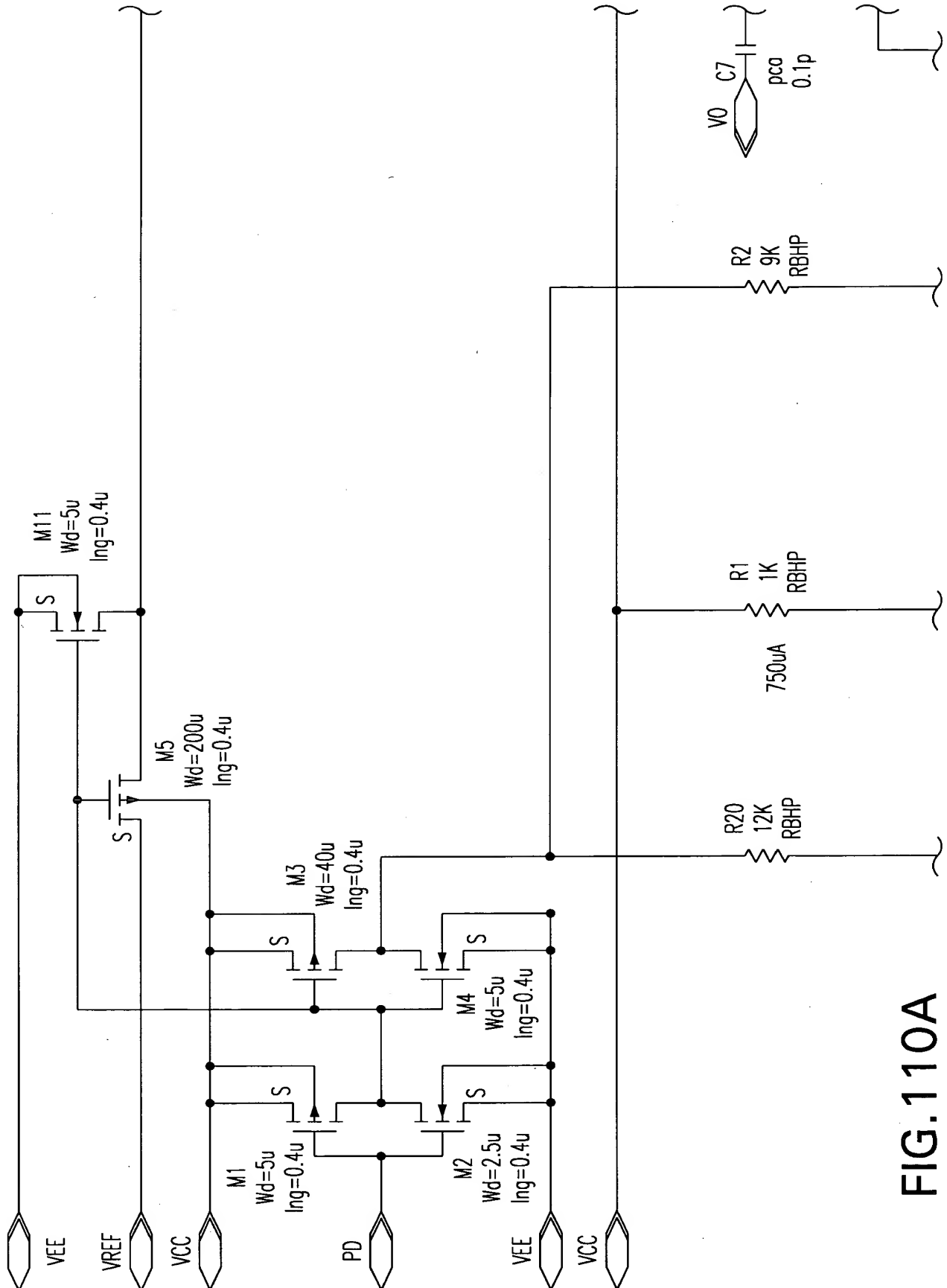
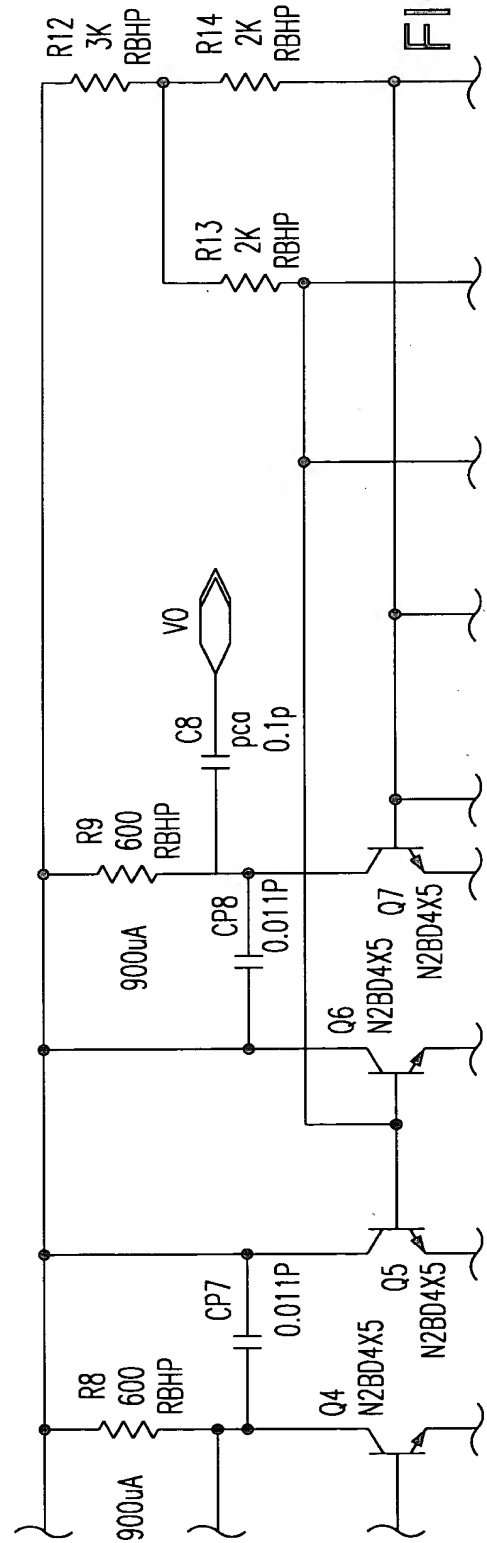


FIG. 110A







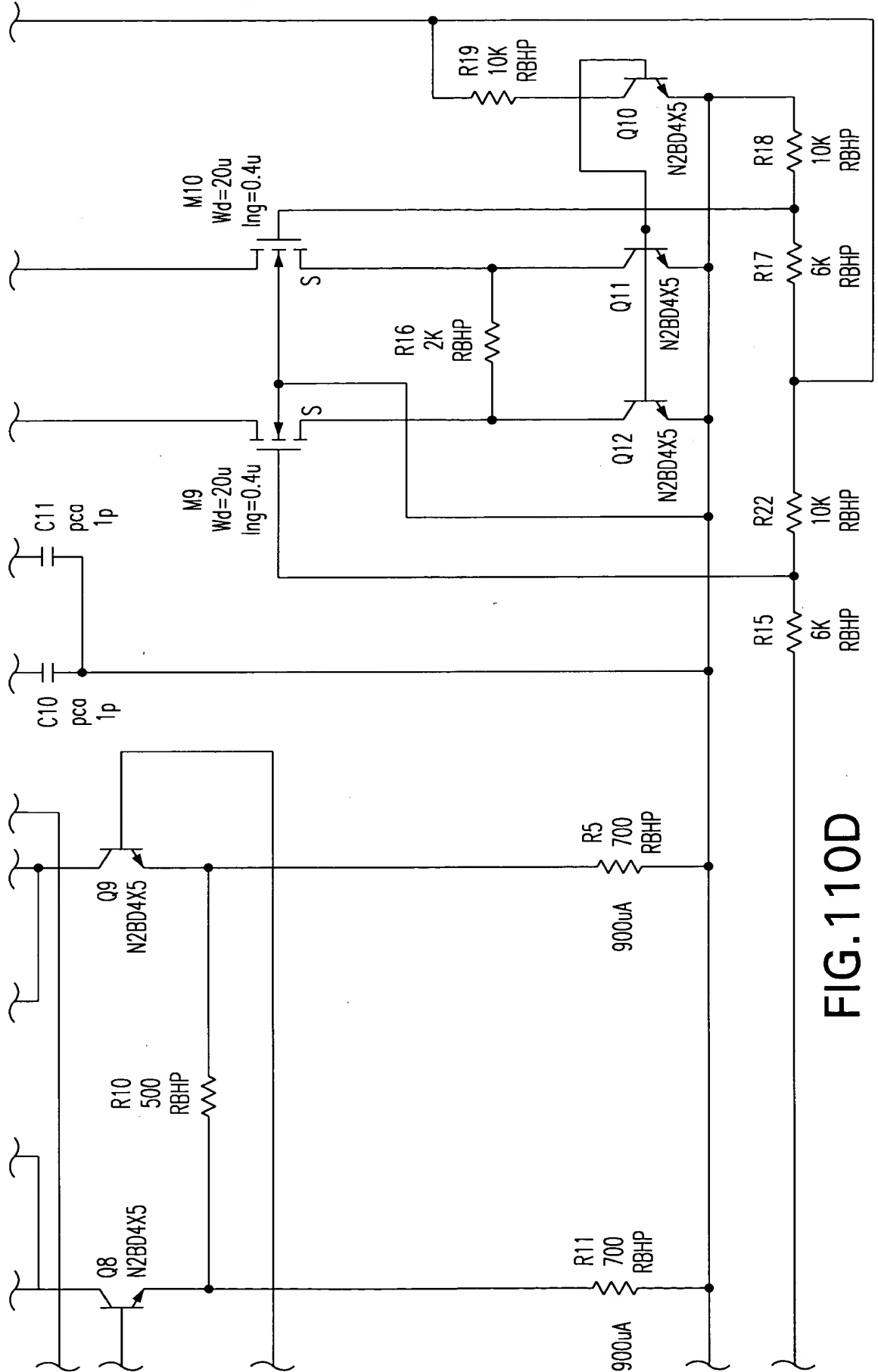


FIG. 110D

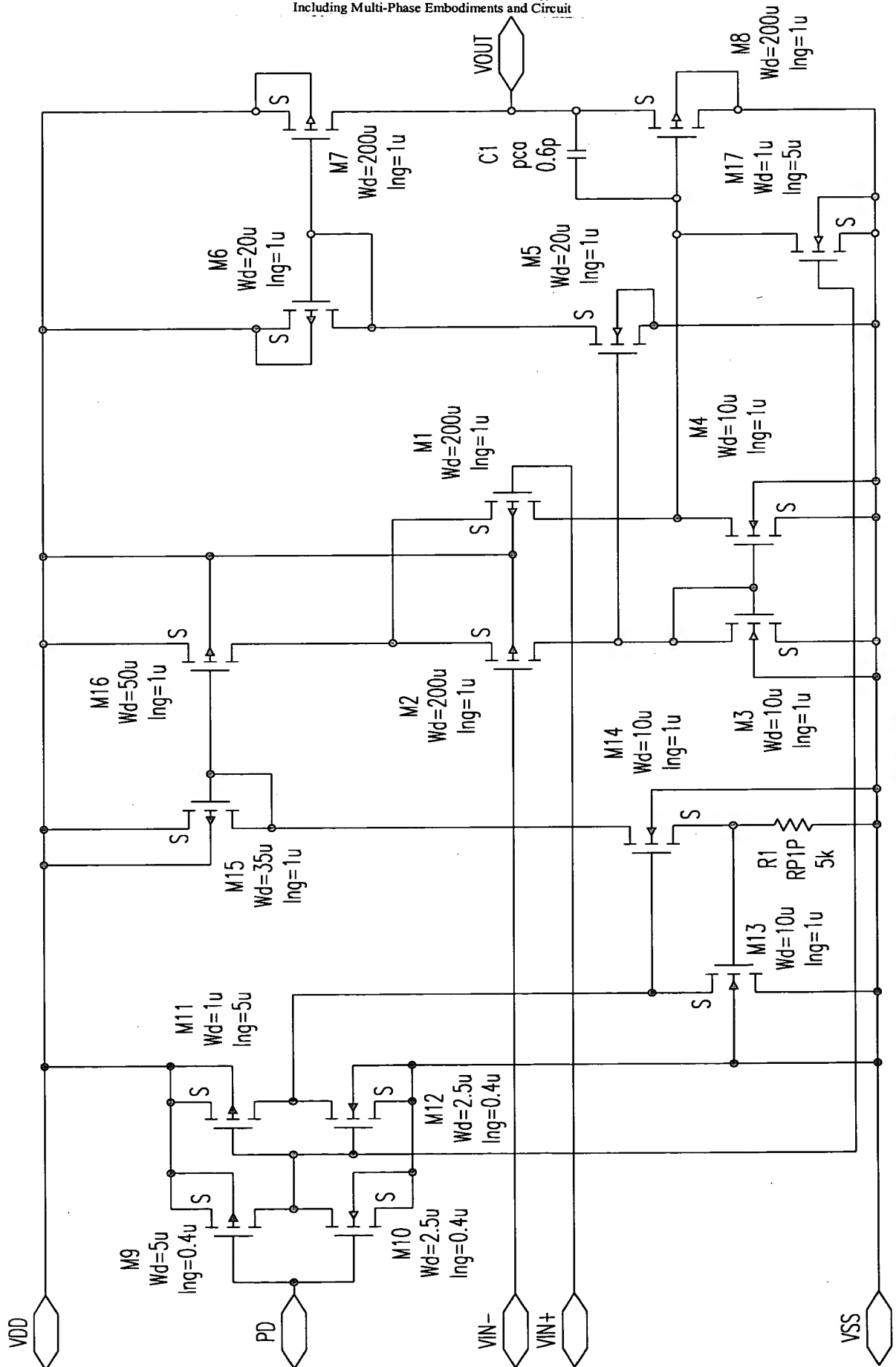


FIG. 111

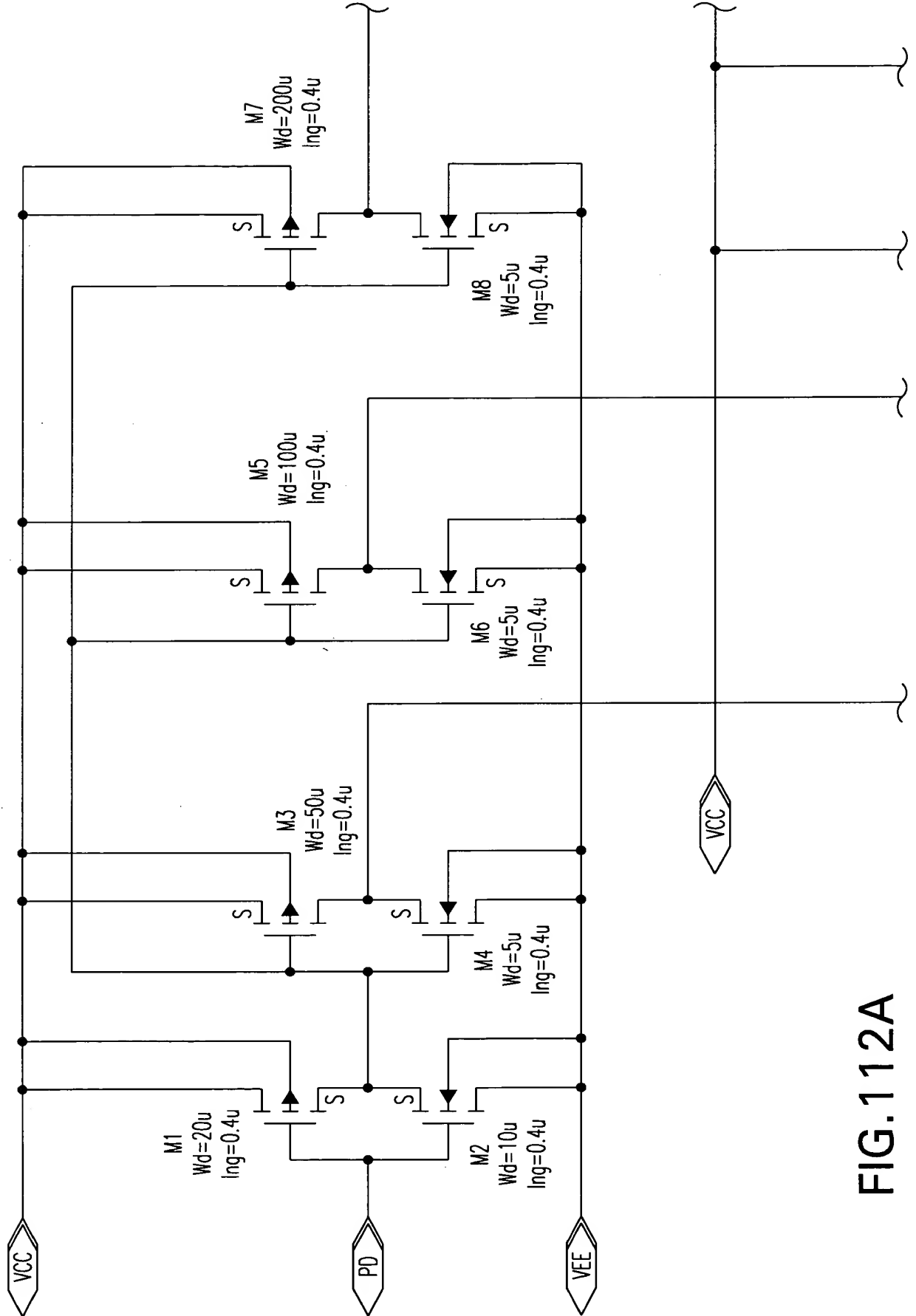
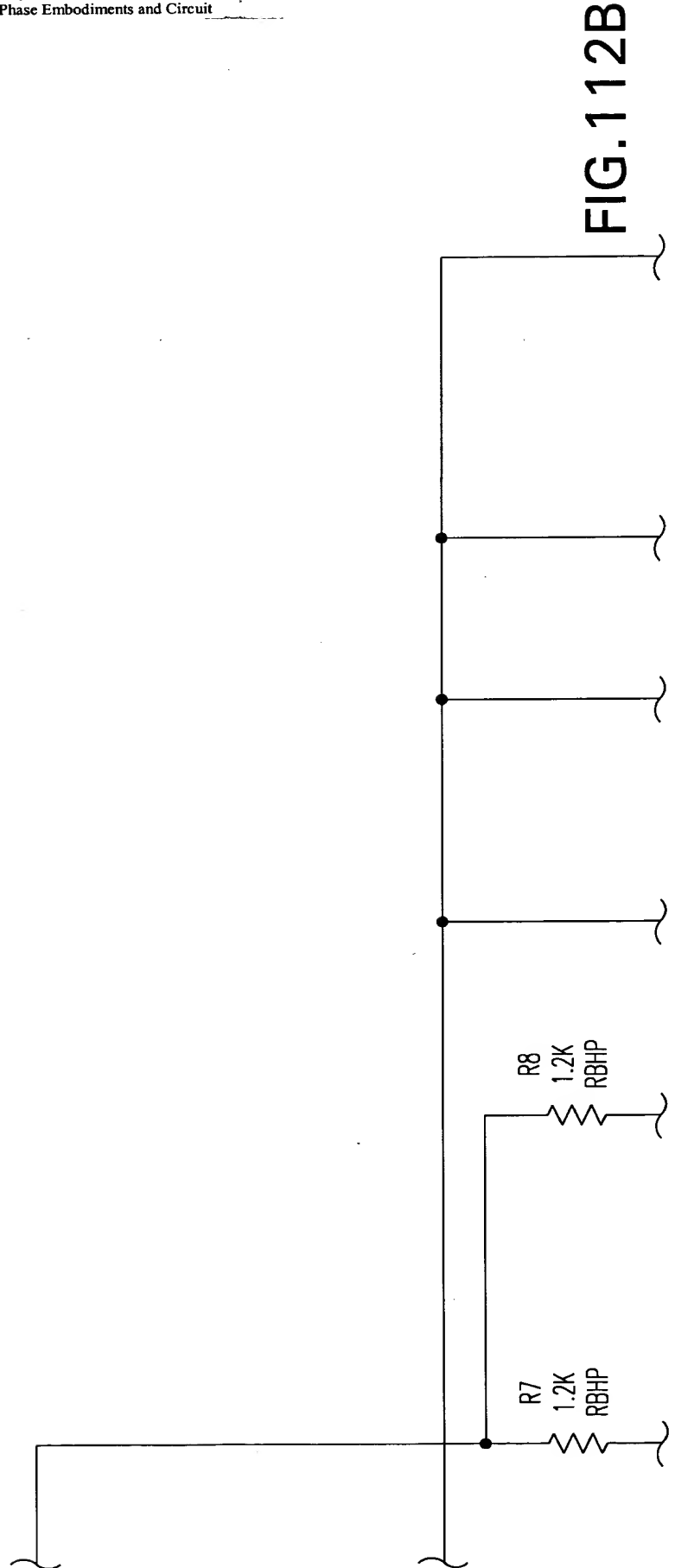


FIG. 112A



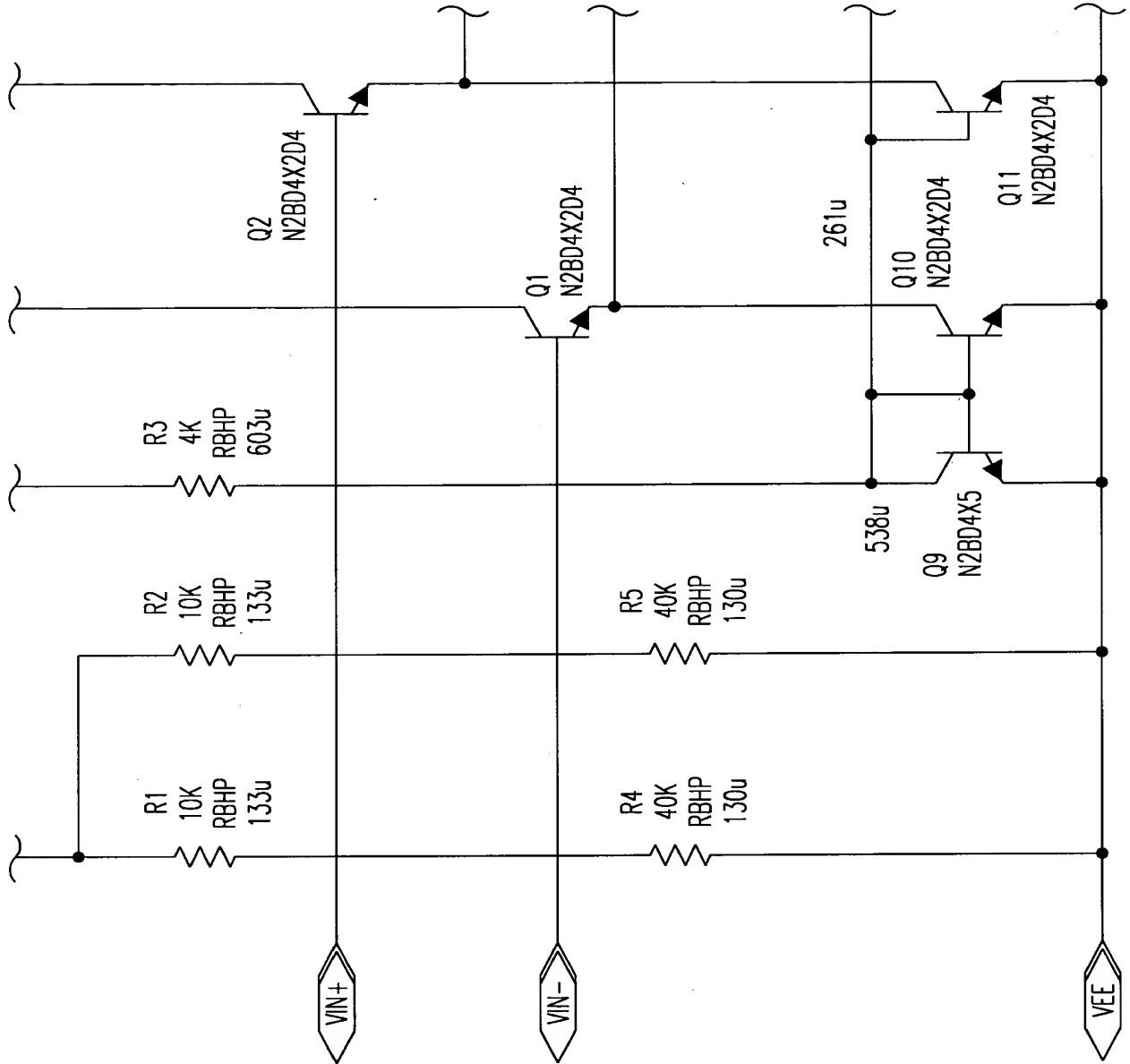


FIG.112C

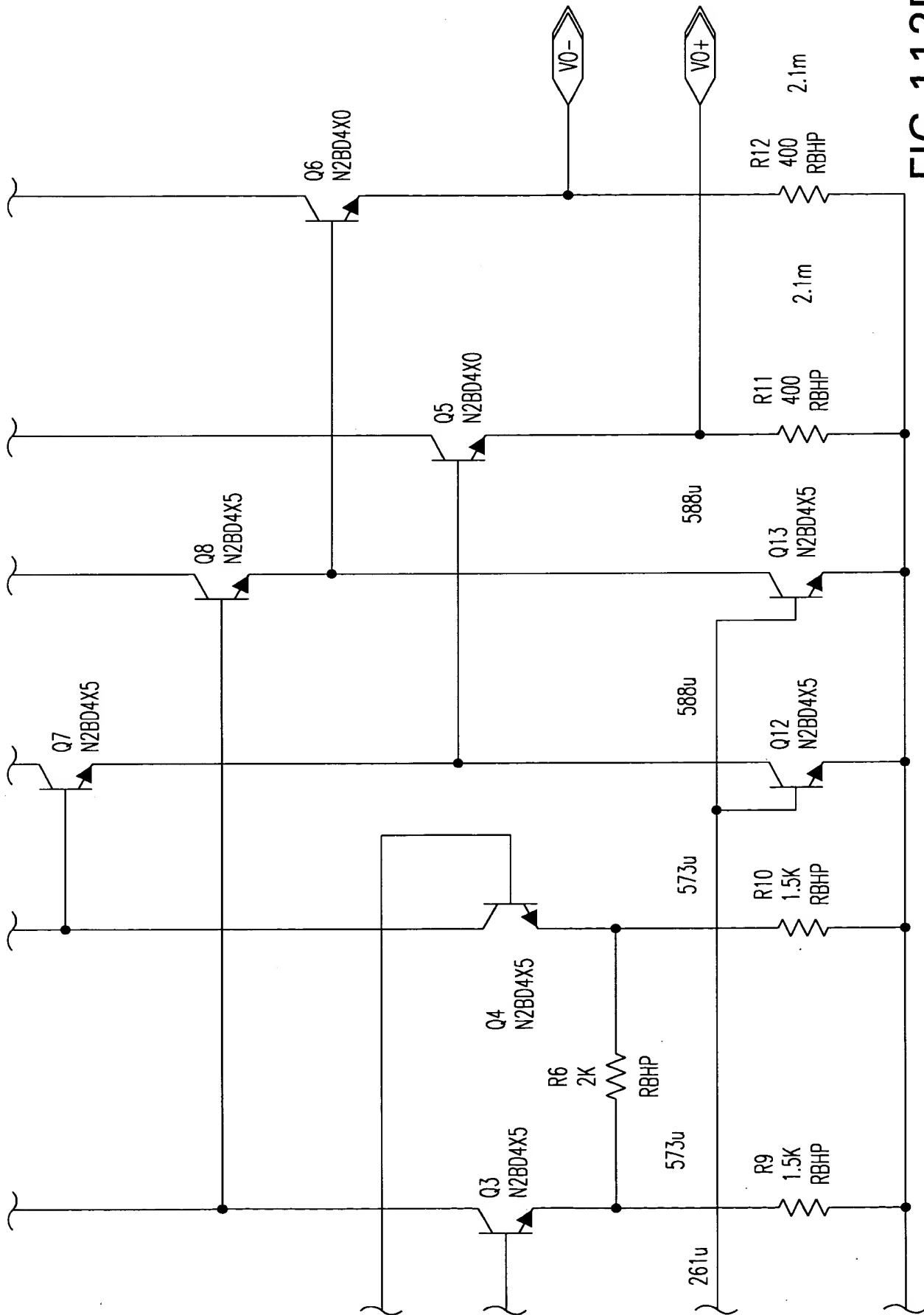


FIG. 112D

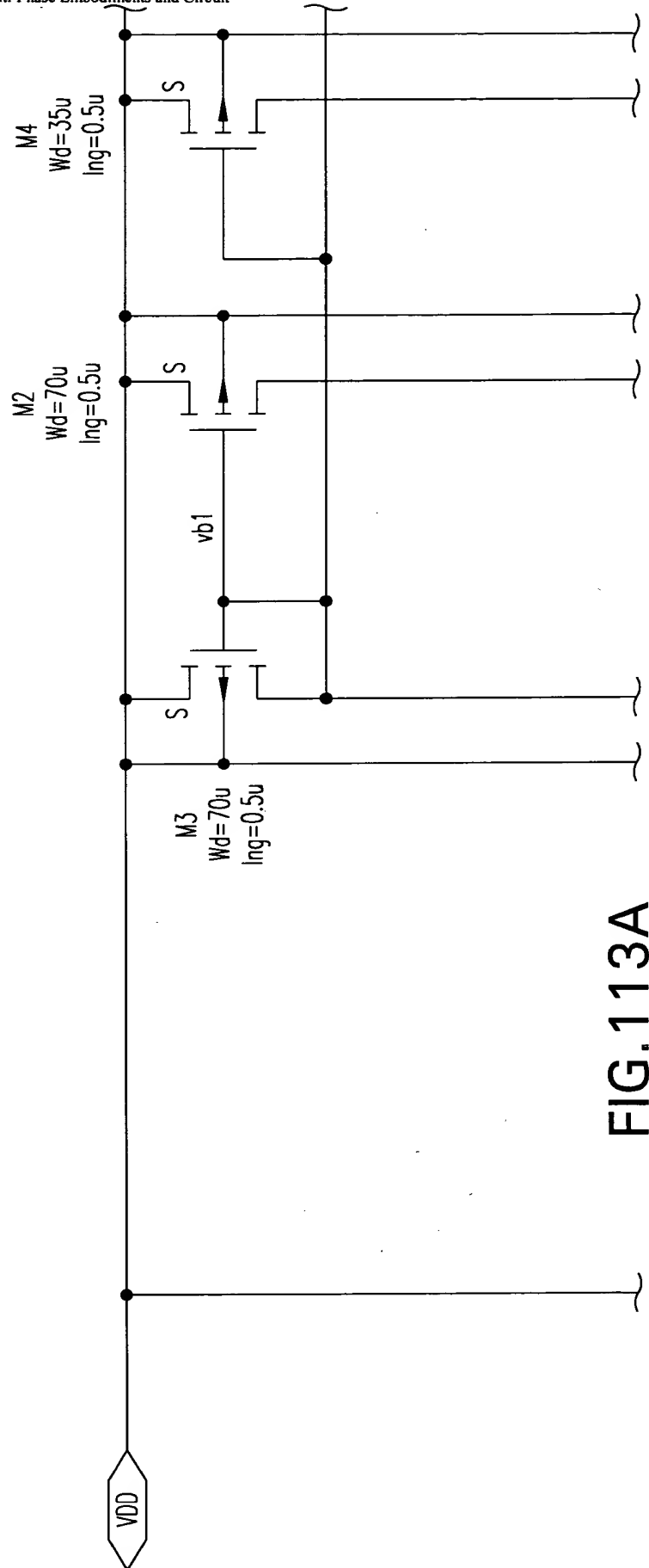


FIG. 113A

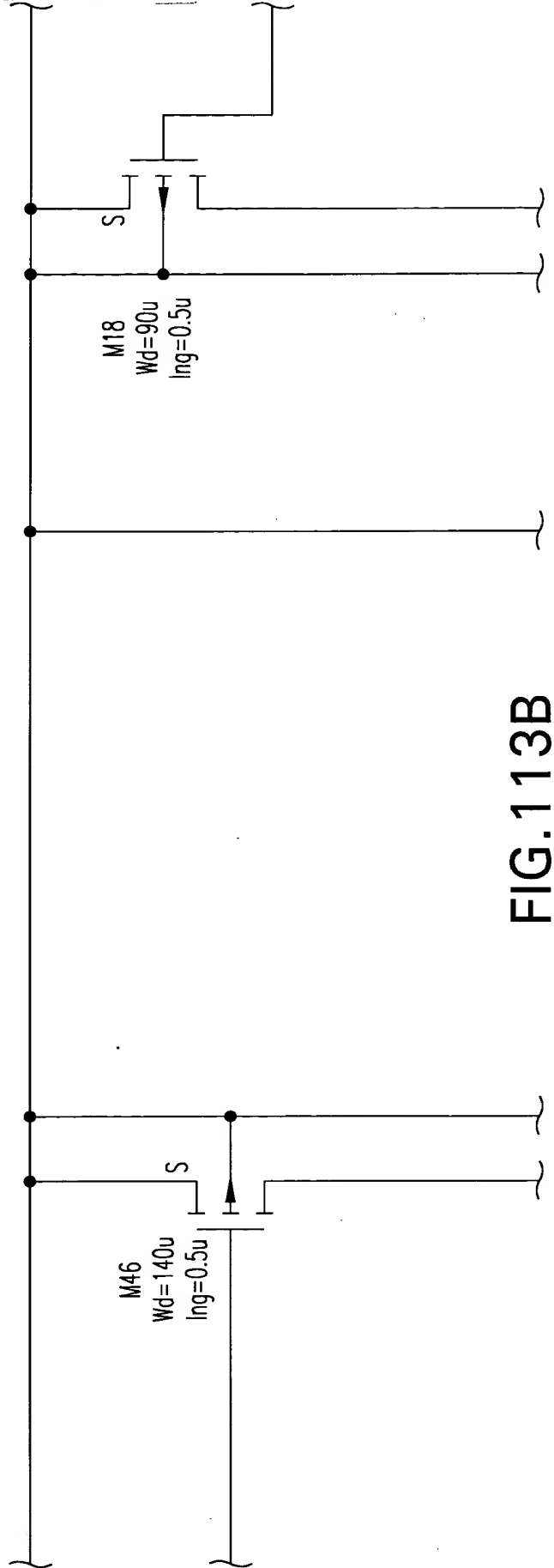


FIG. 113B



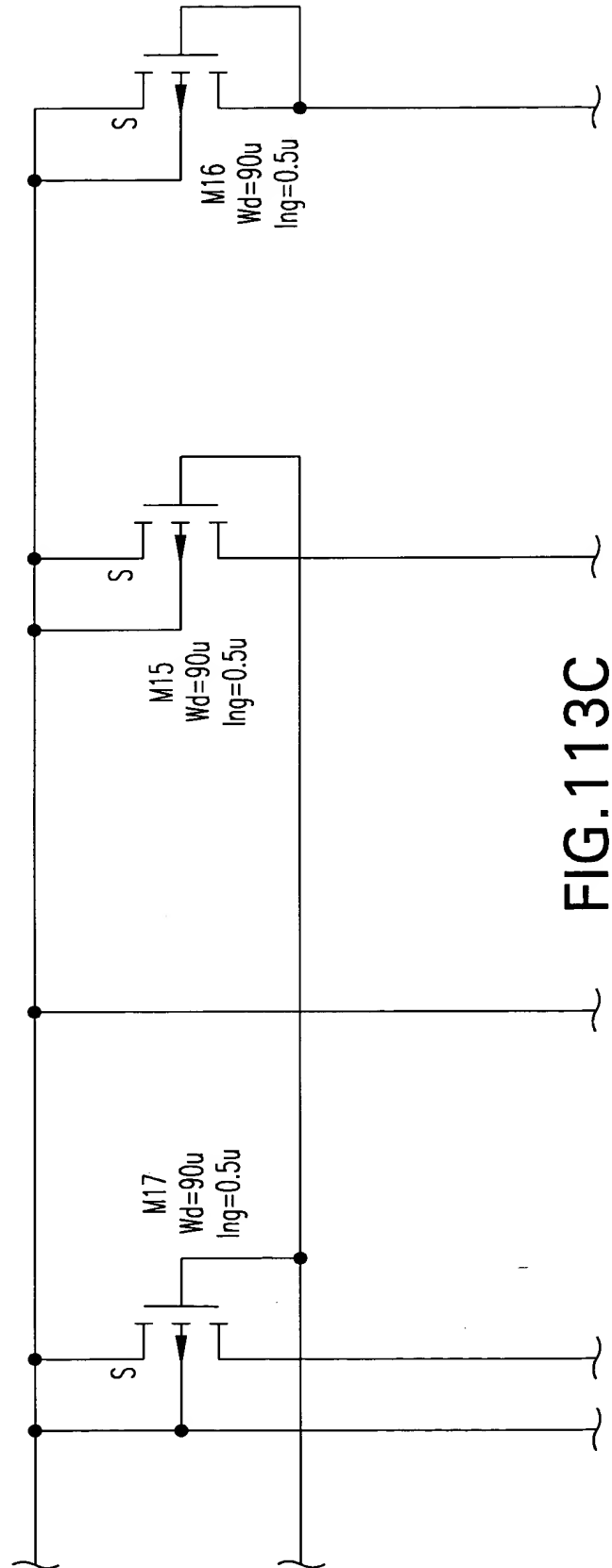
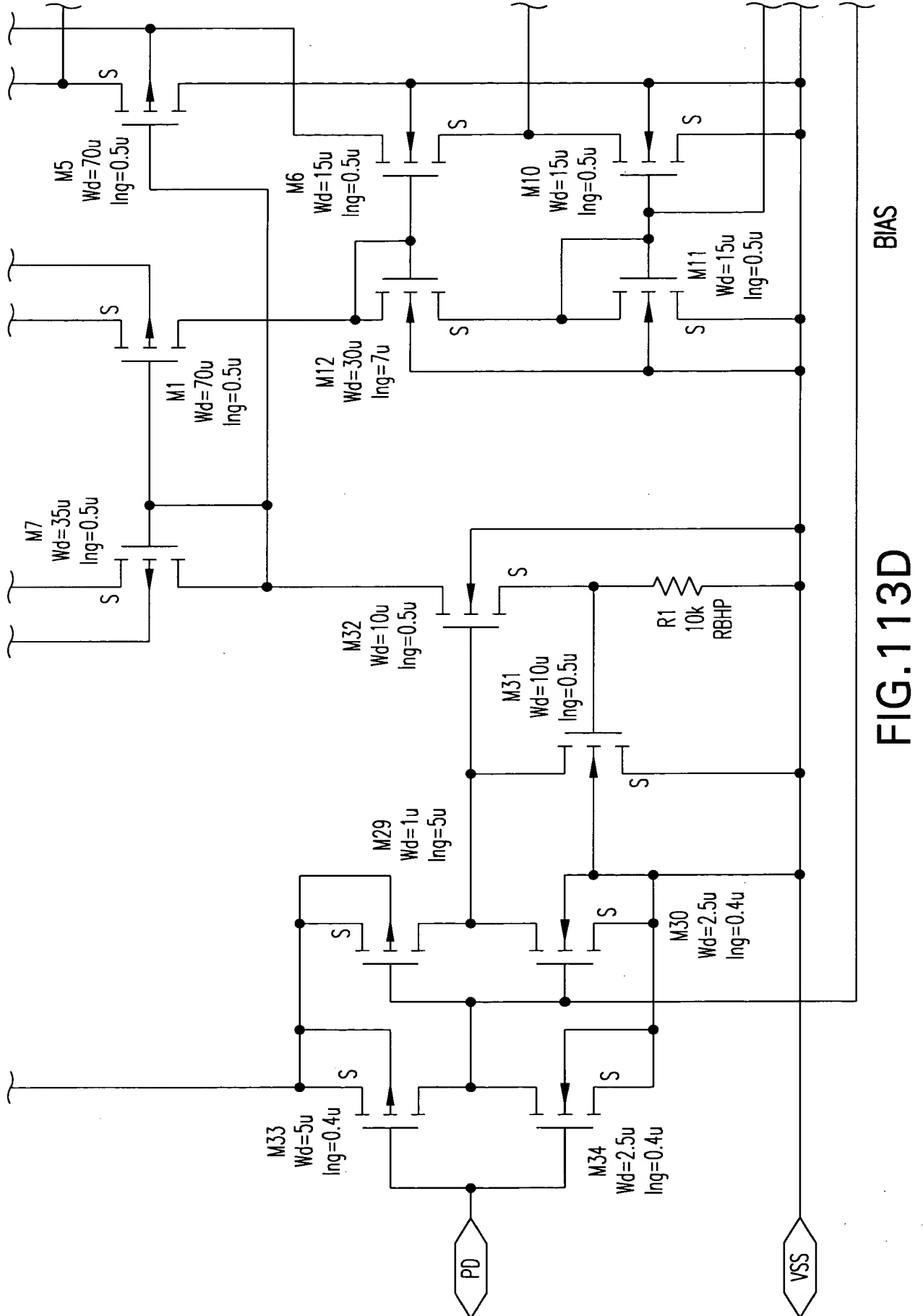


FIG. 113C



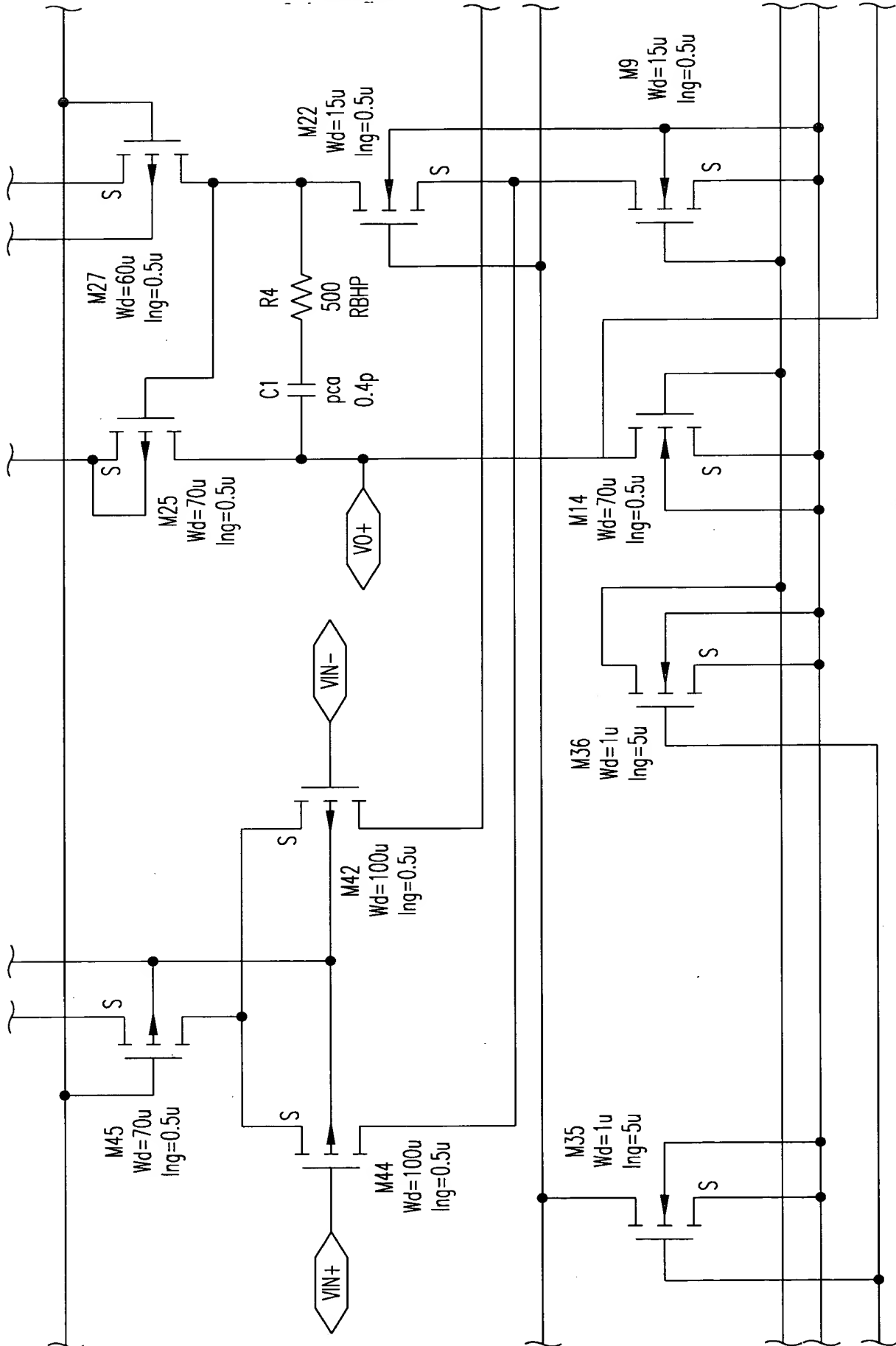
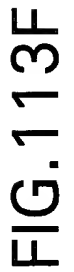


FIG. 113E



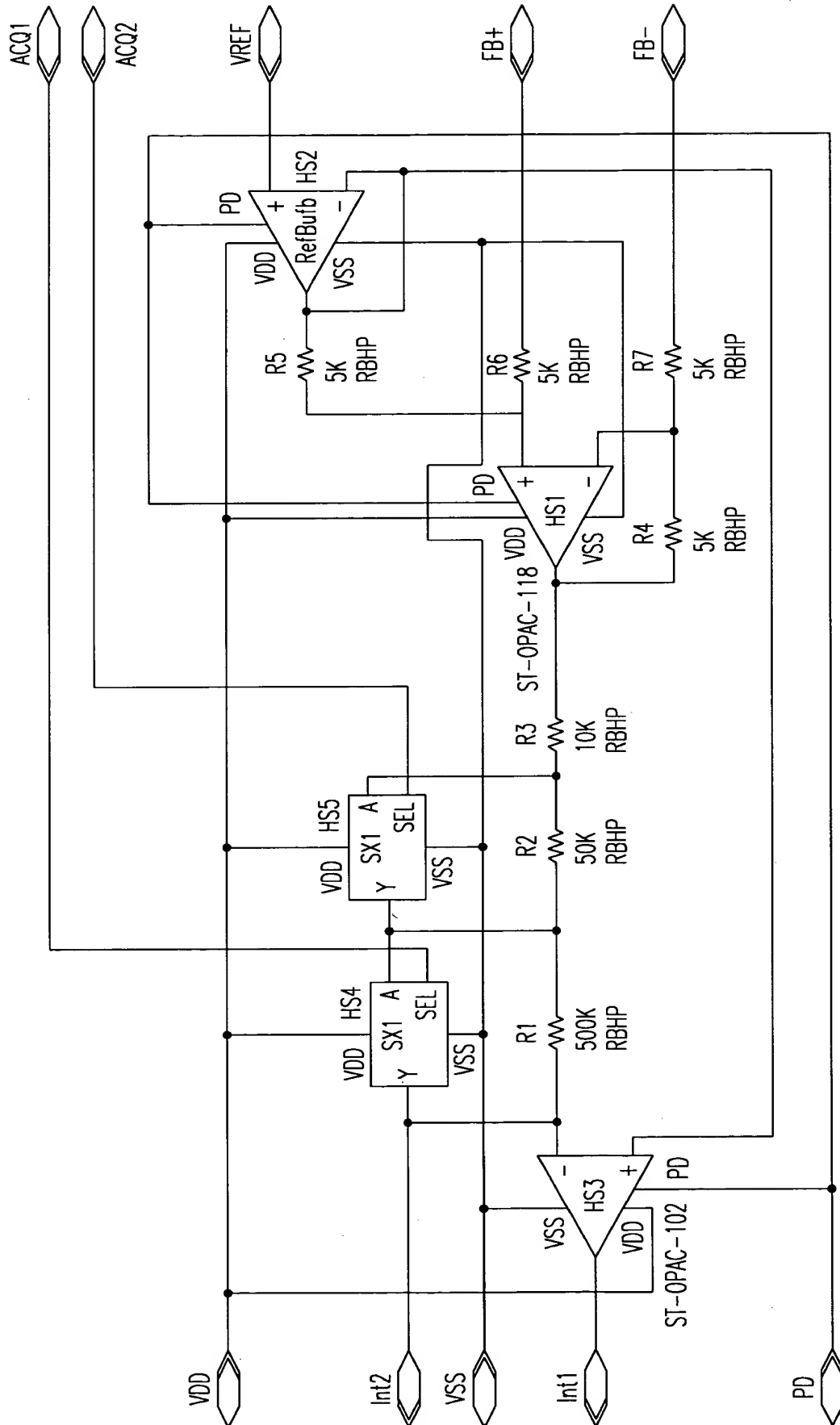


FIG. 114

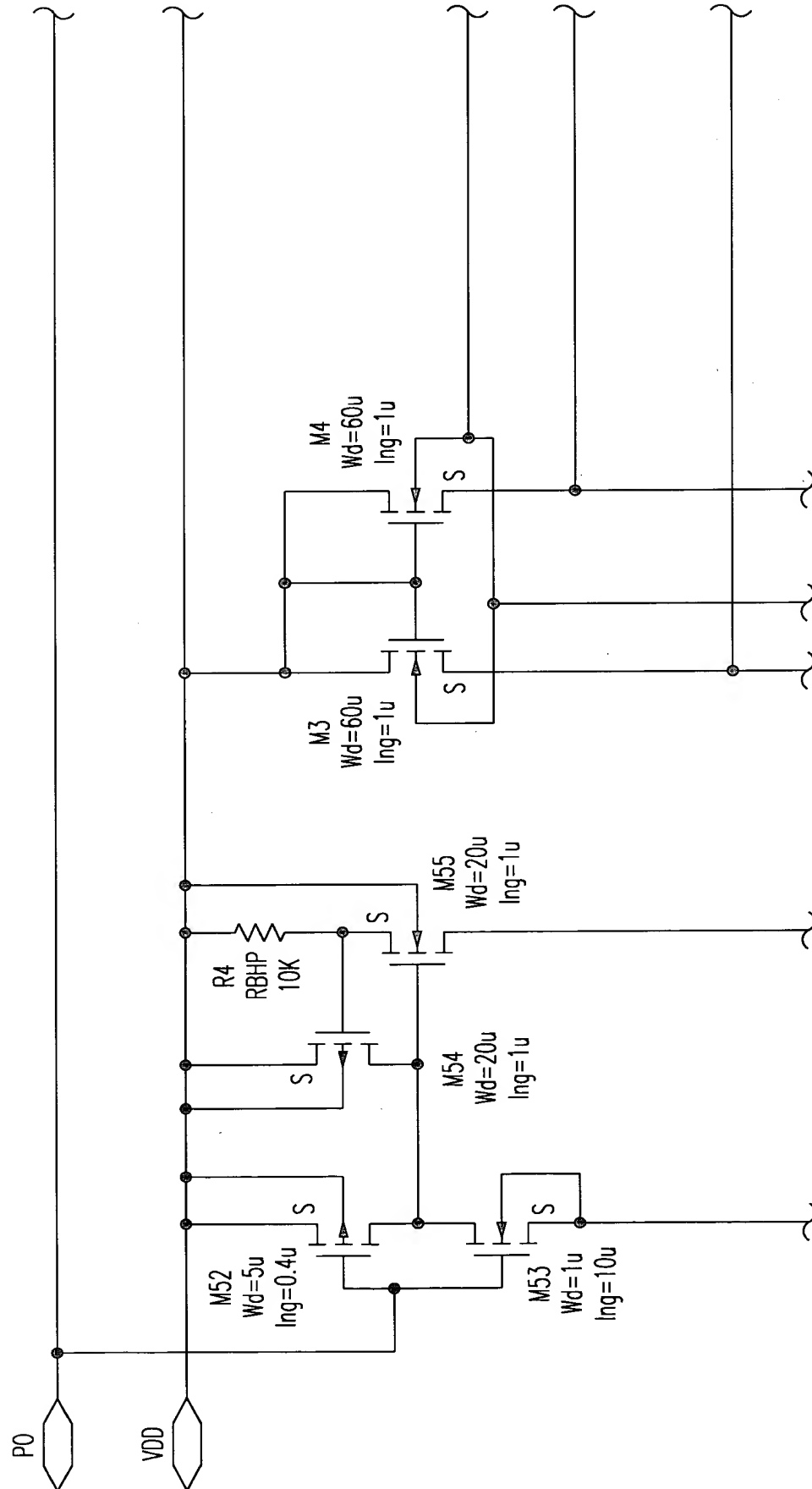
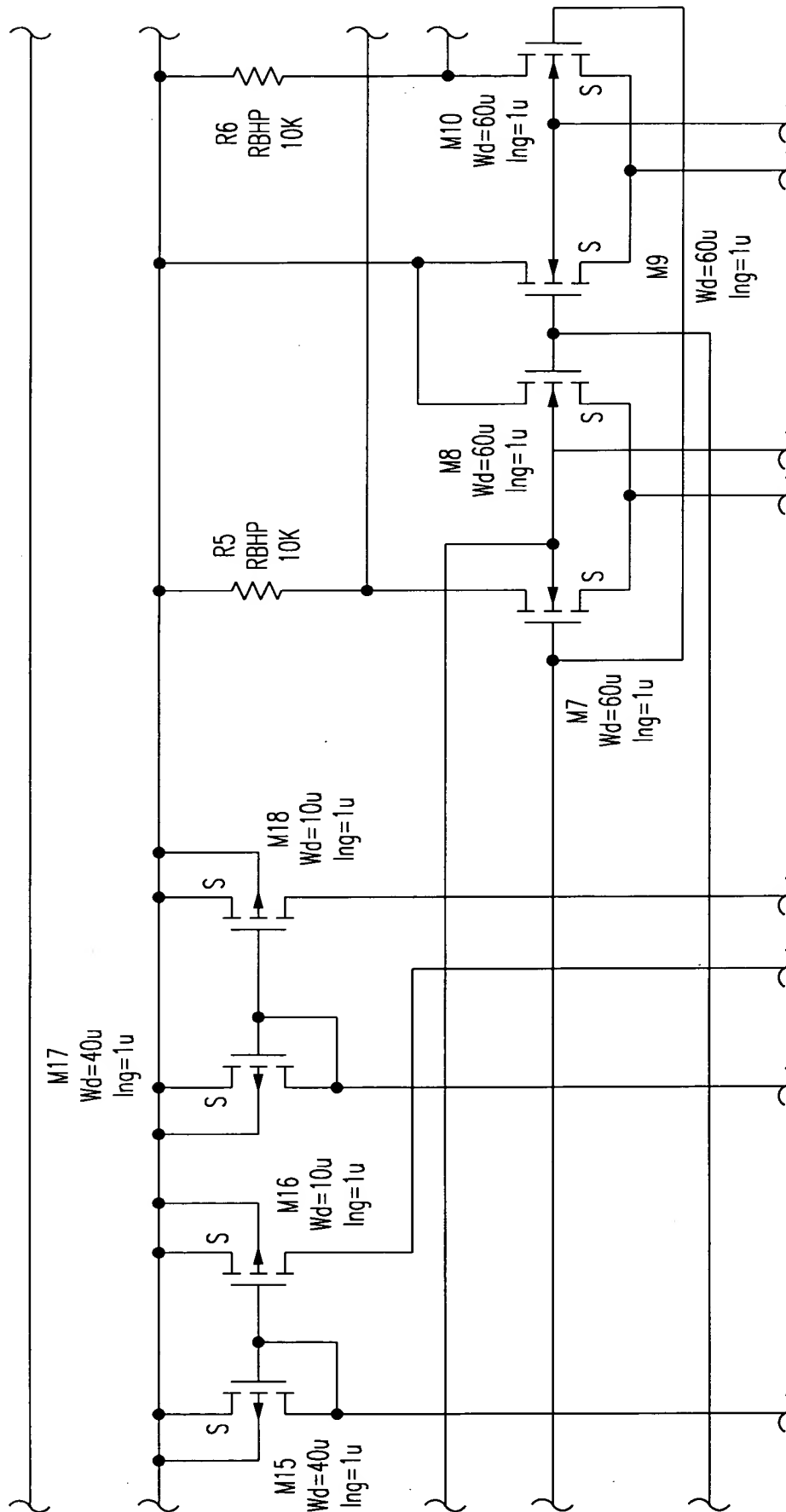
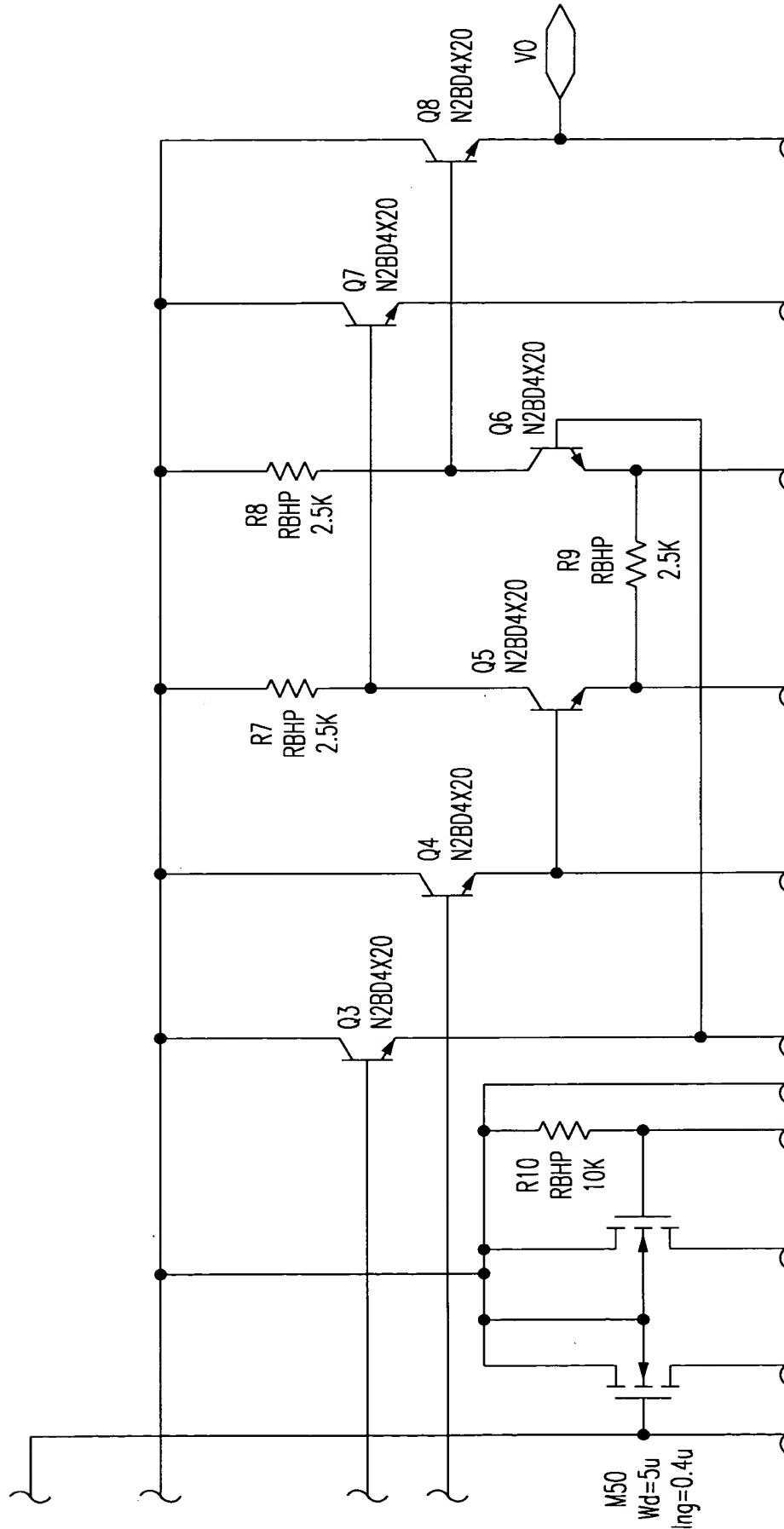


FIG. 115A



**FIG. 115B**





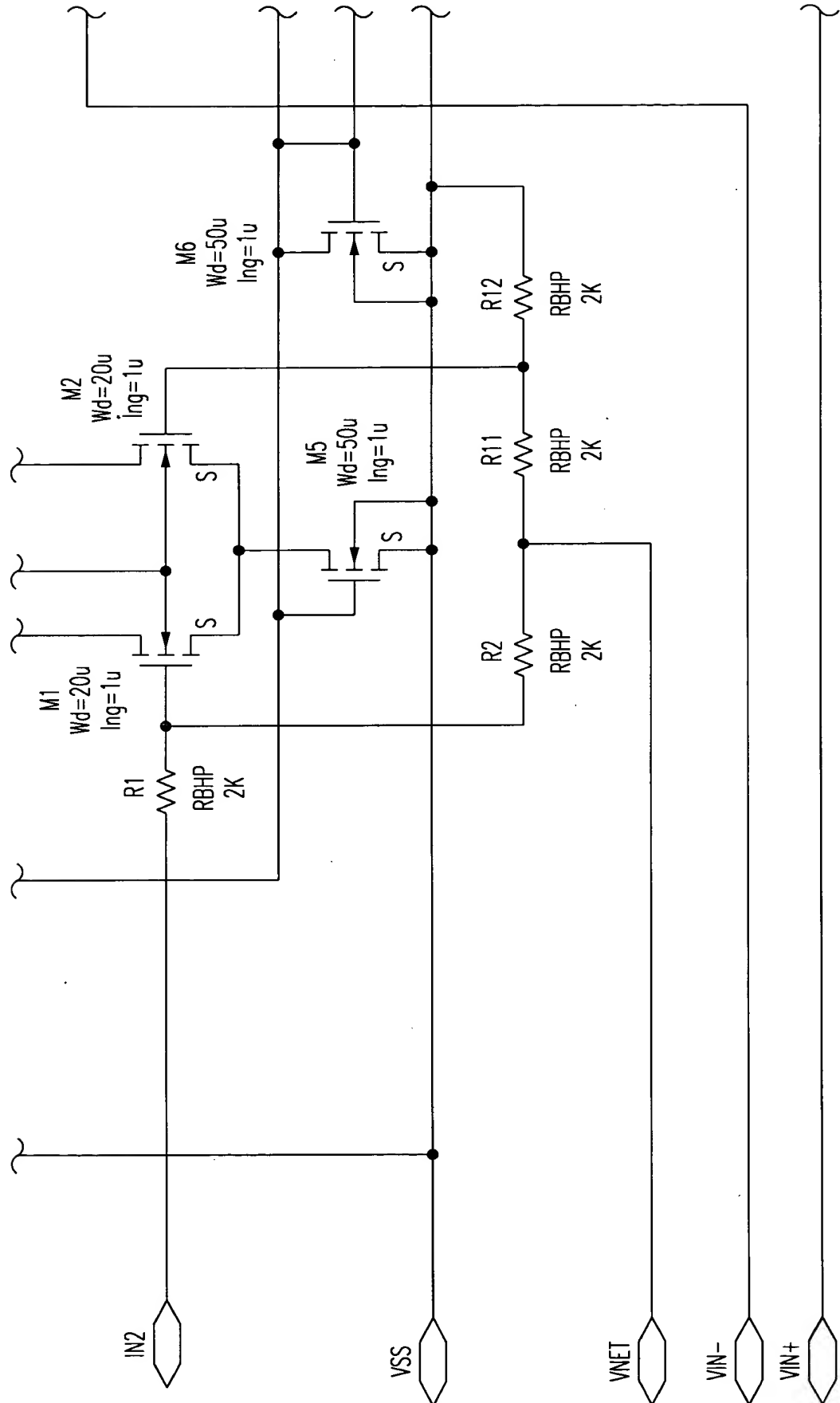


FIG.115D

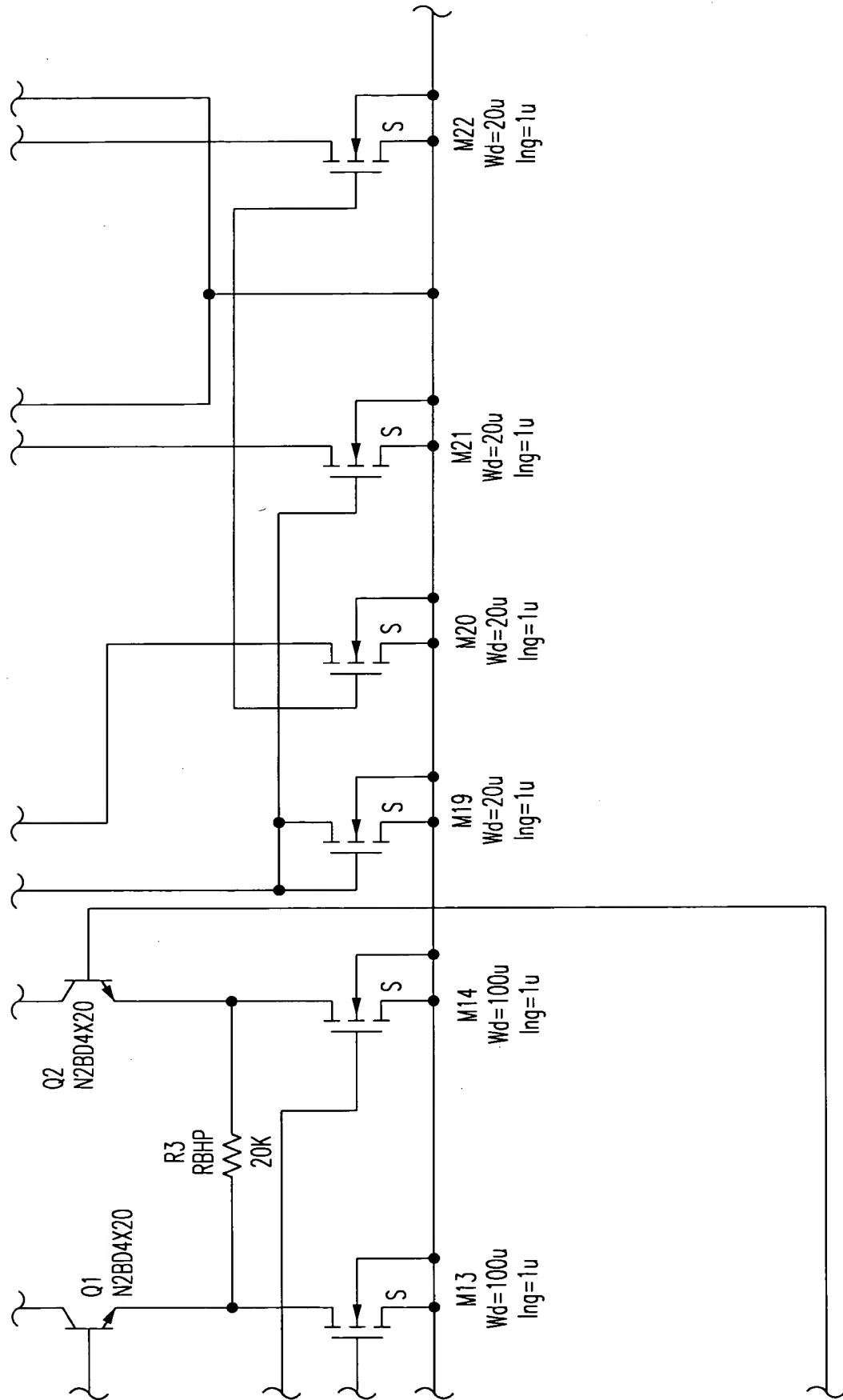


FIG. 115E

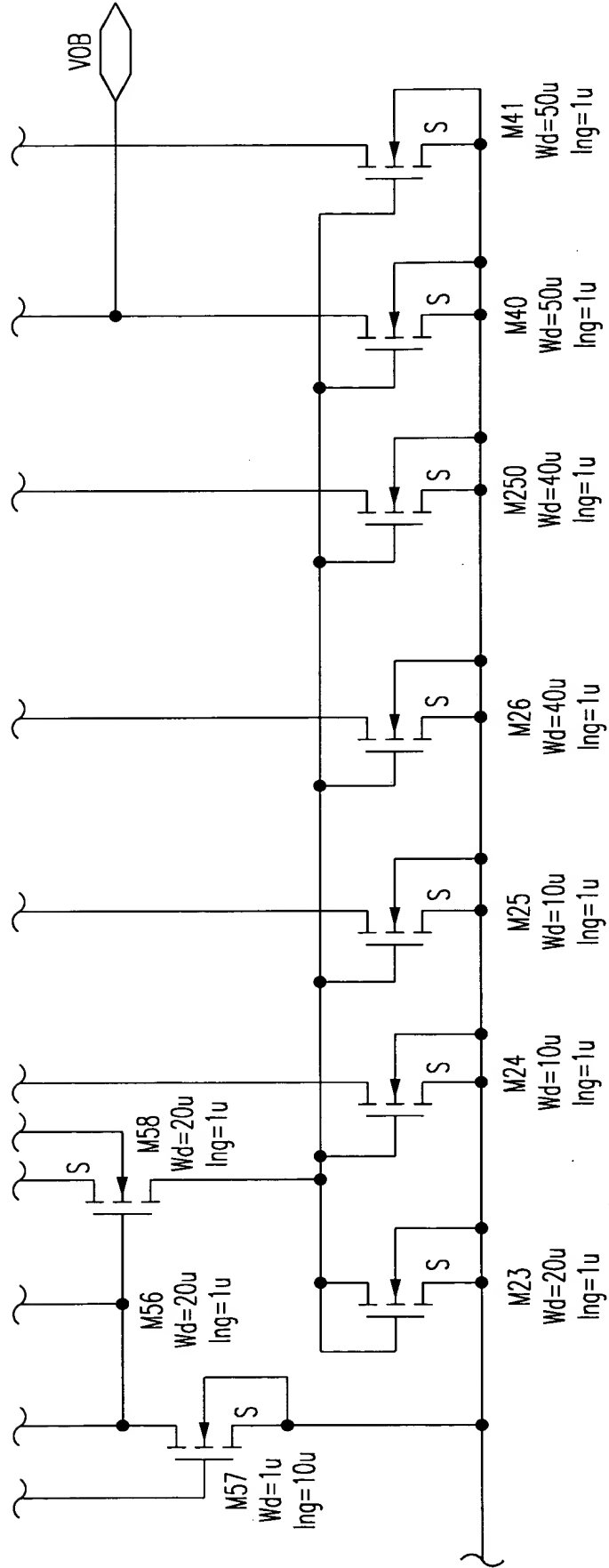


FIG. 115F

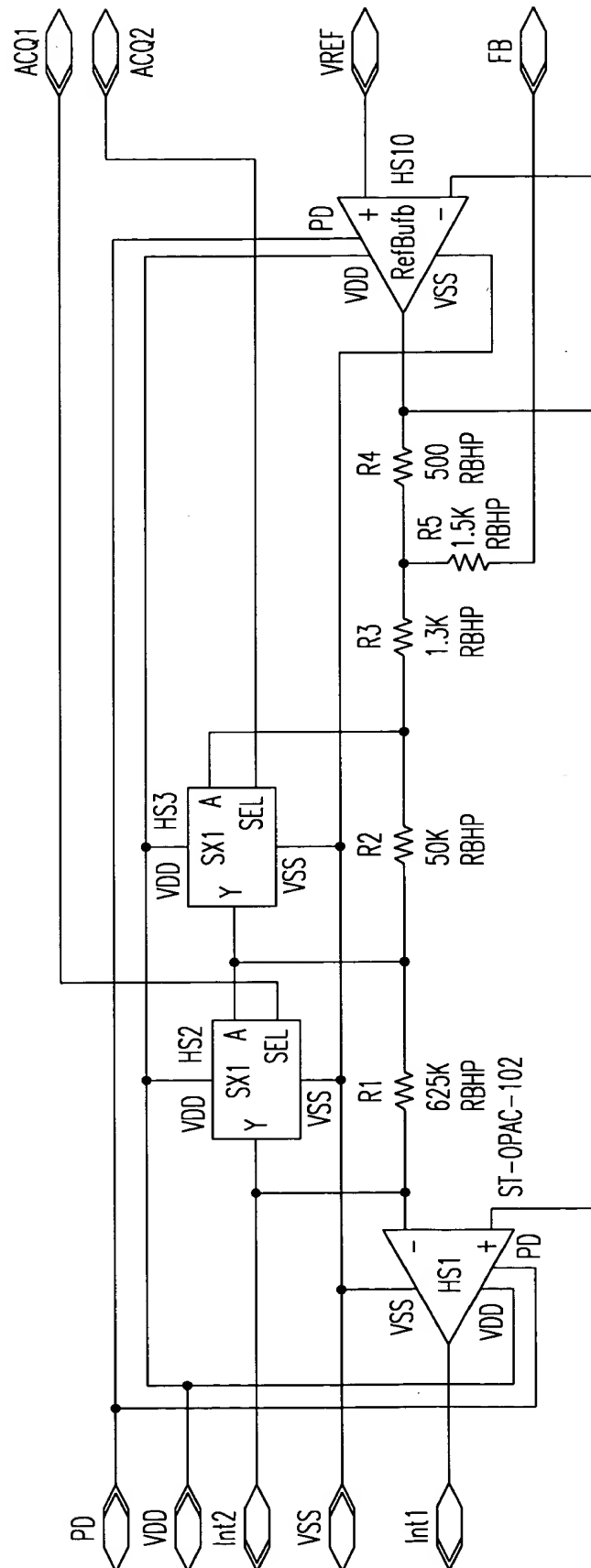


FIG. 116

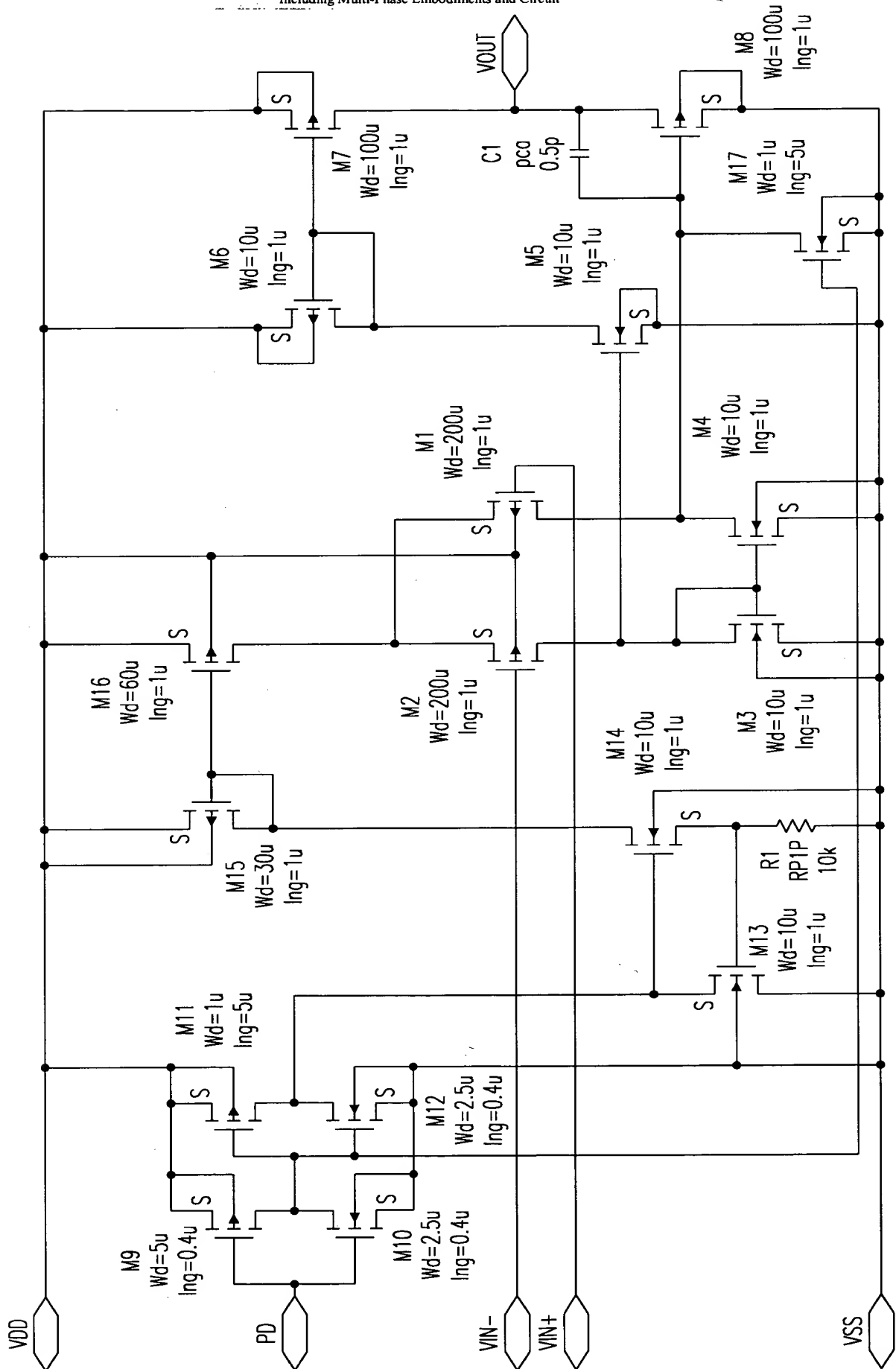


FIG. 117

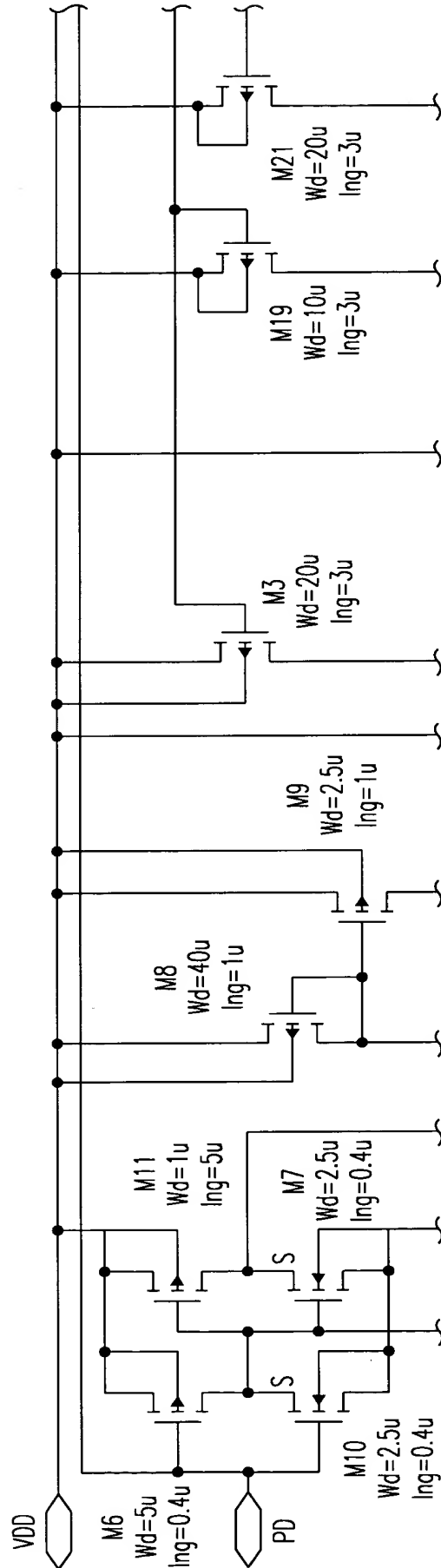


FIG. 118A

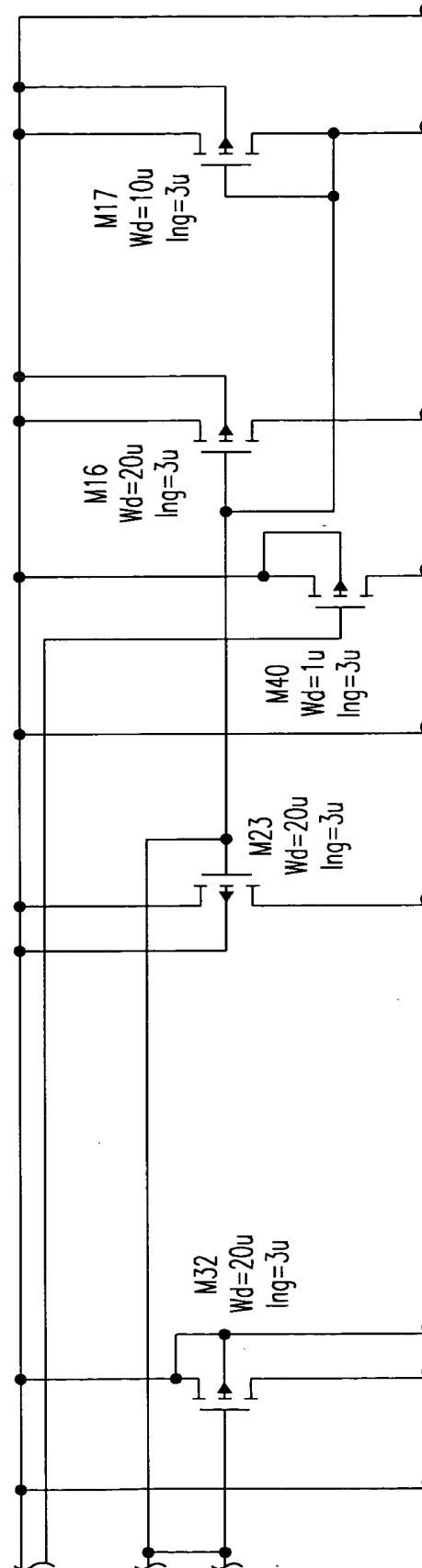


FIG. 118B

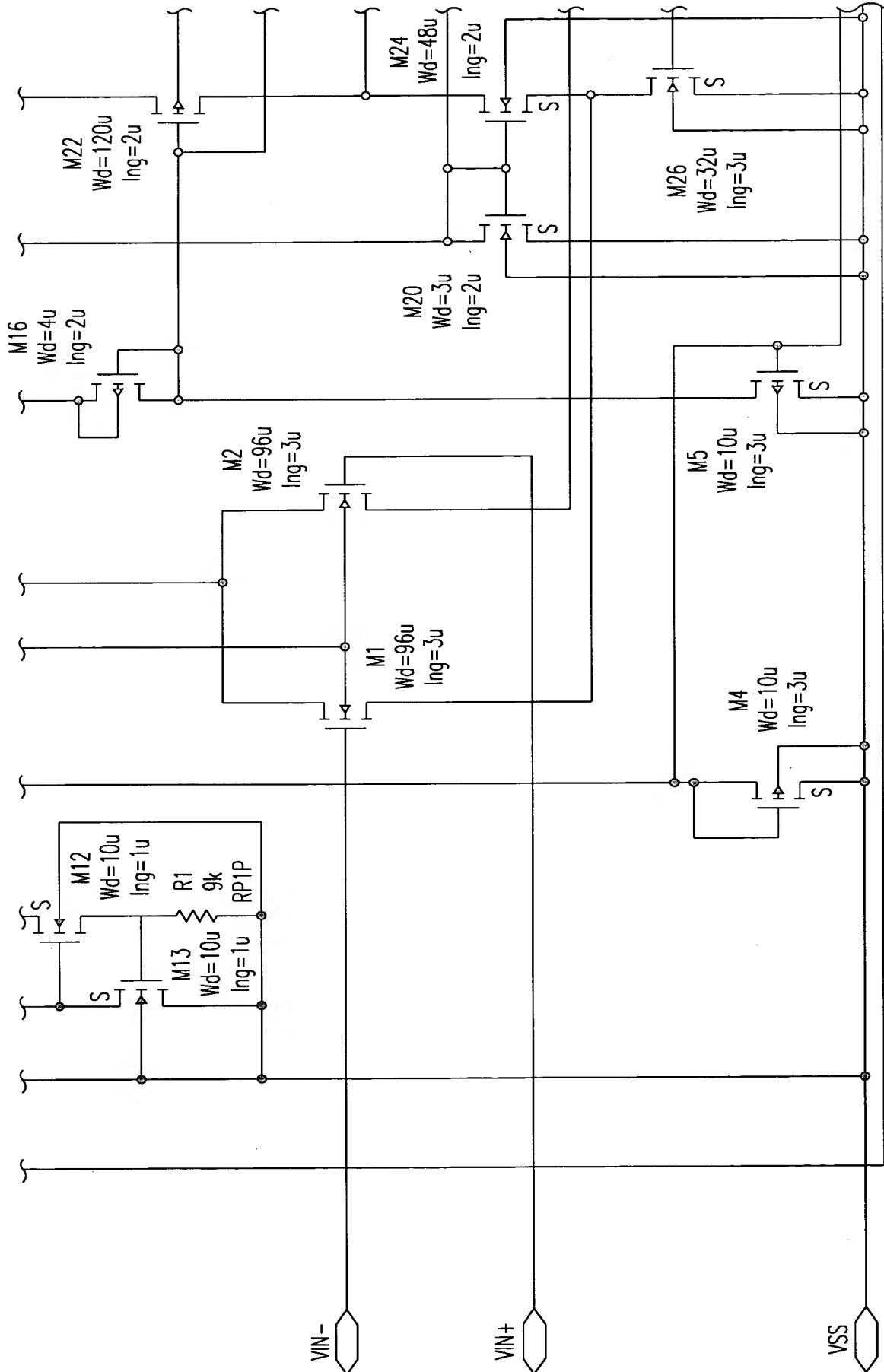


FIG. 118C



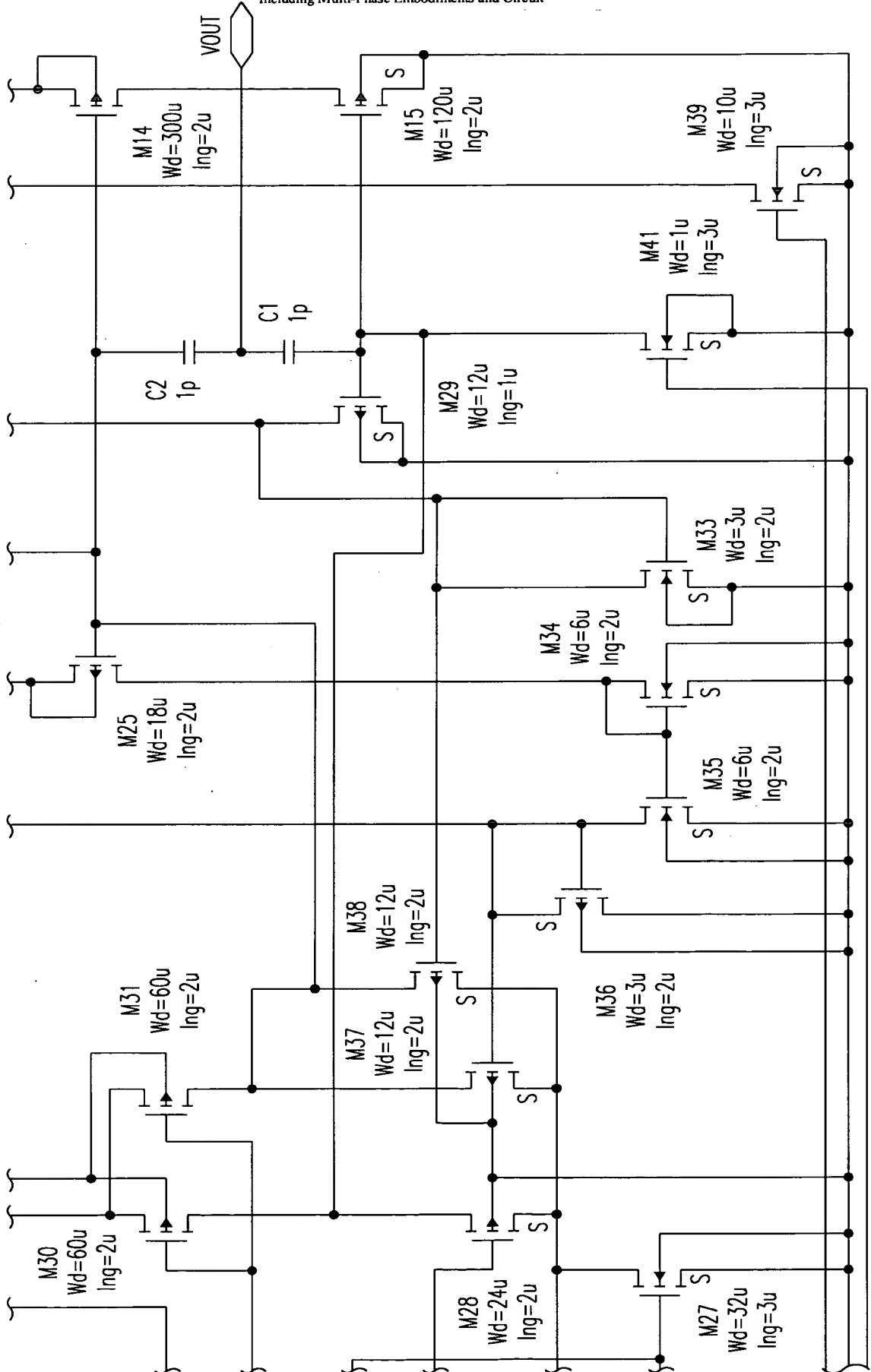
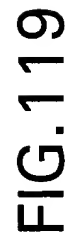


FIG.118D



**FIG. 119**

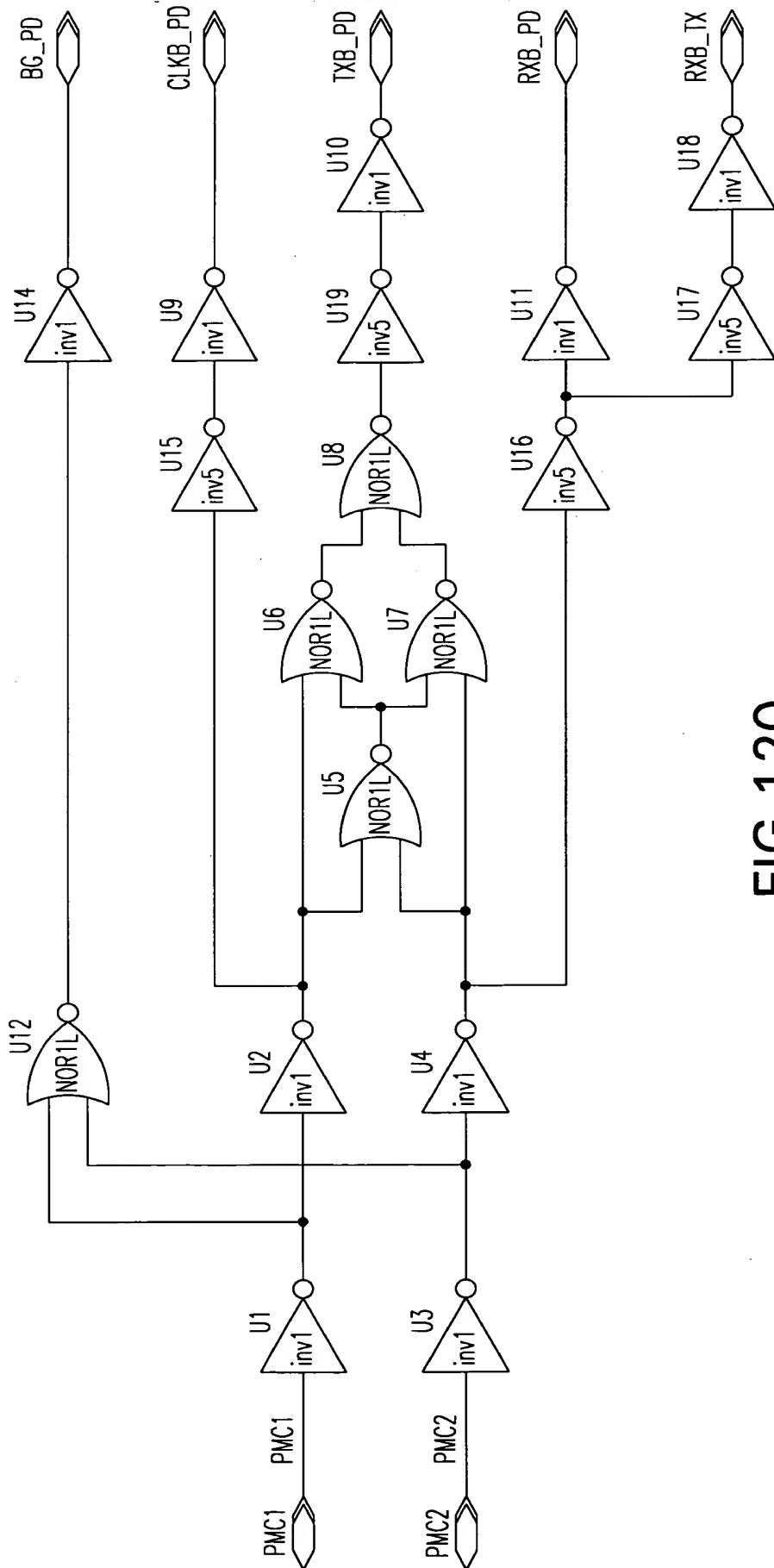


FIG. 120

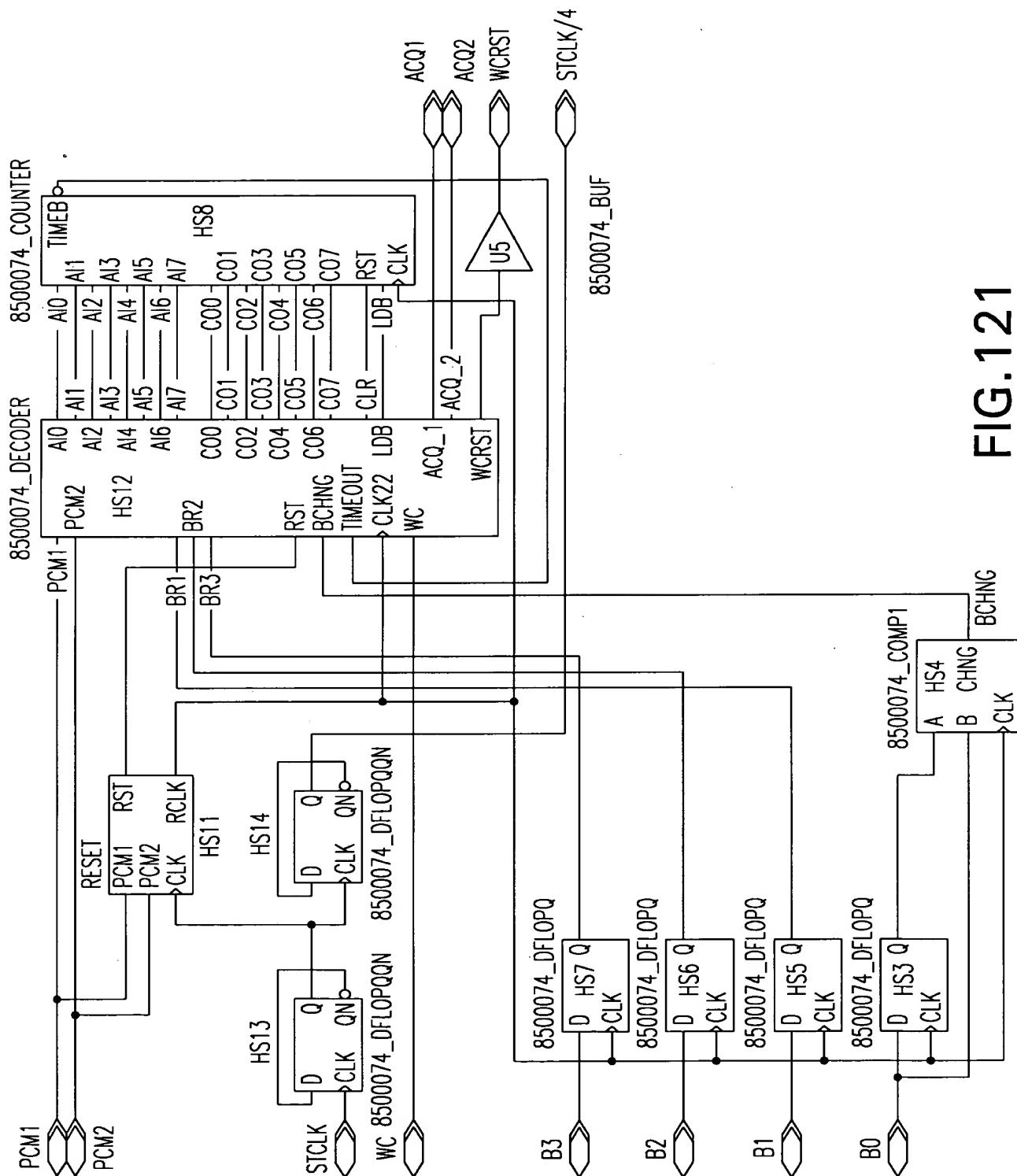


FIG. 121

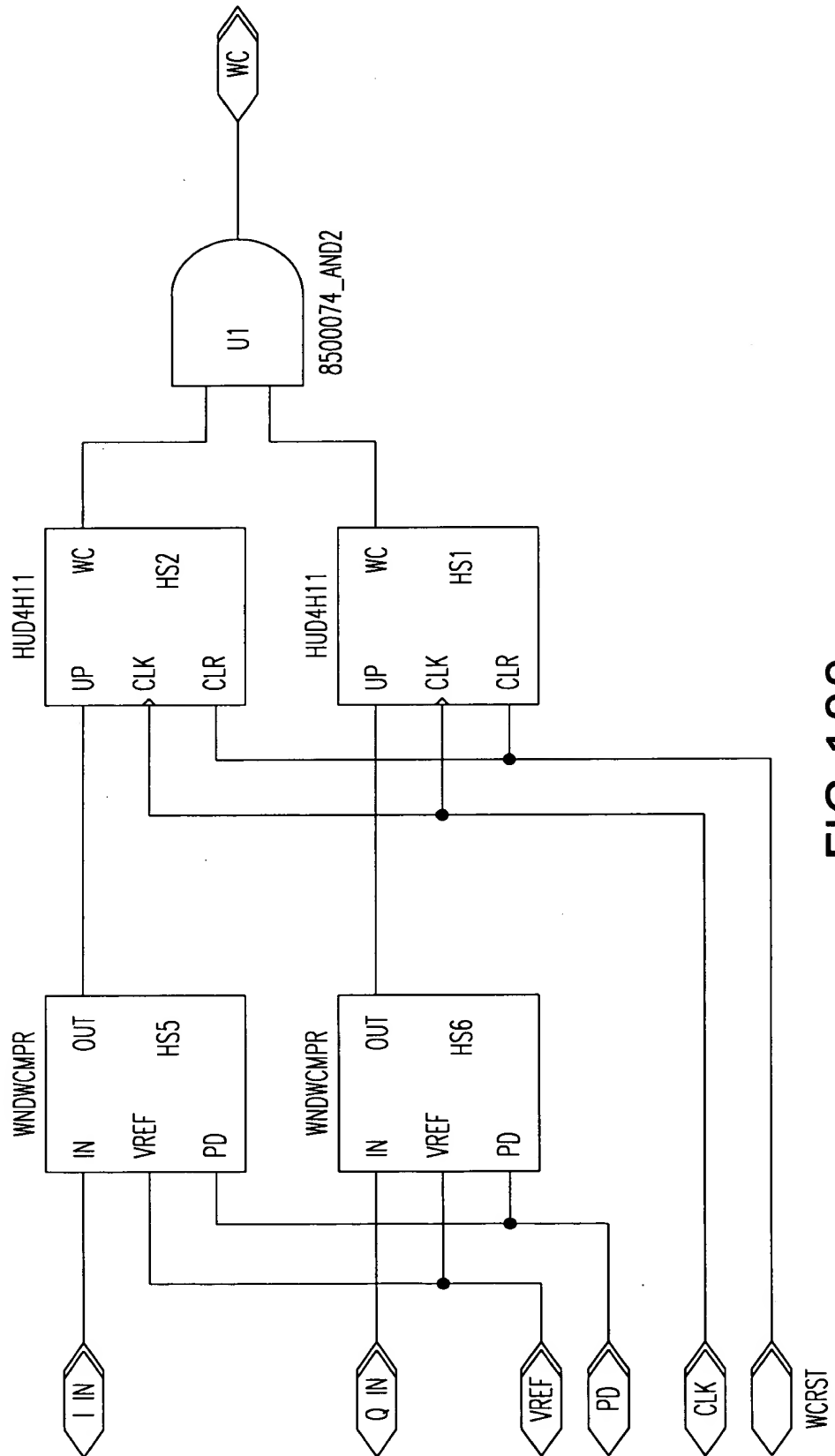


FIG. 122

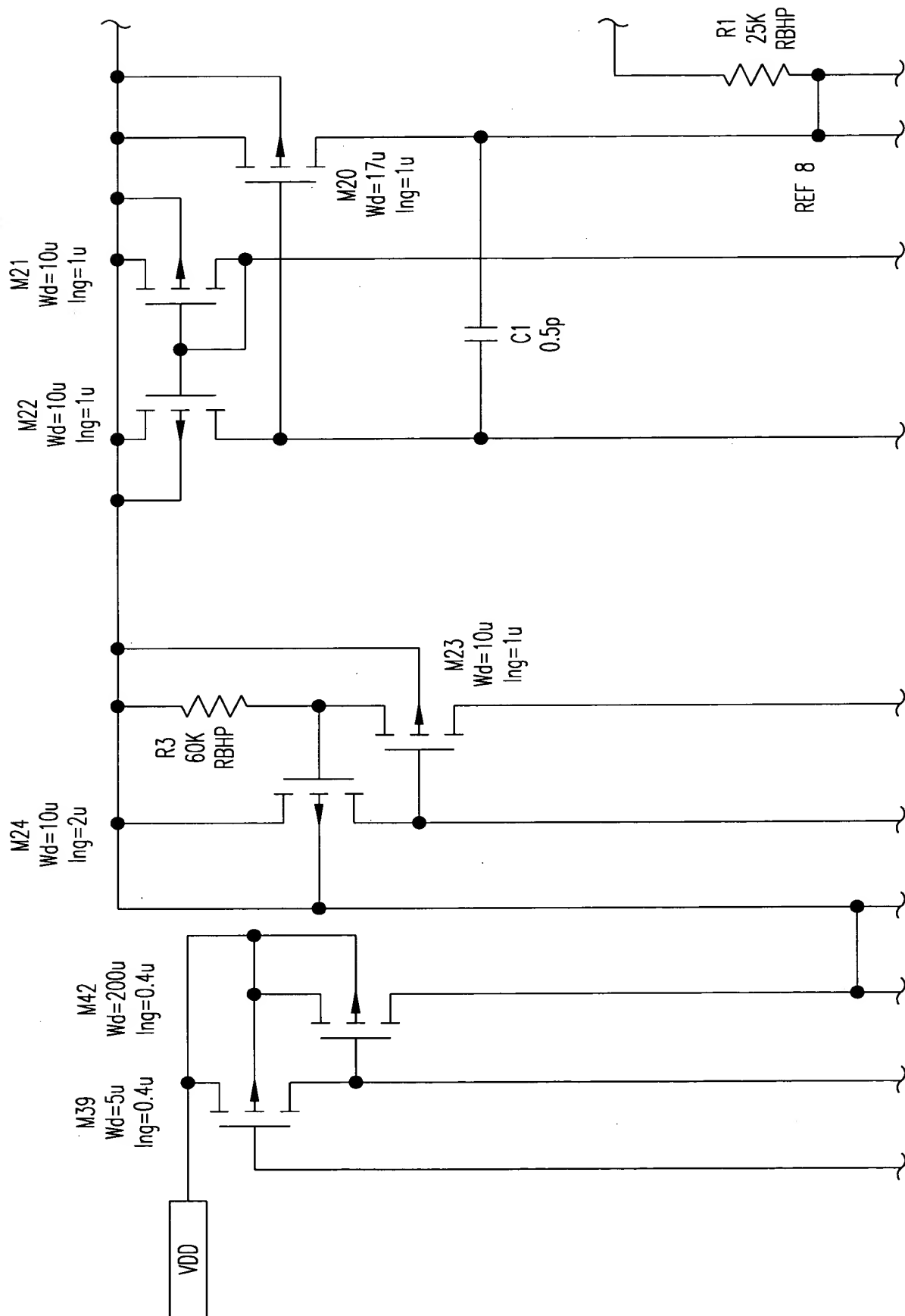


FIG. 123A

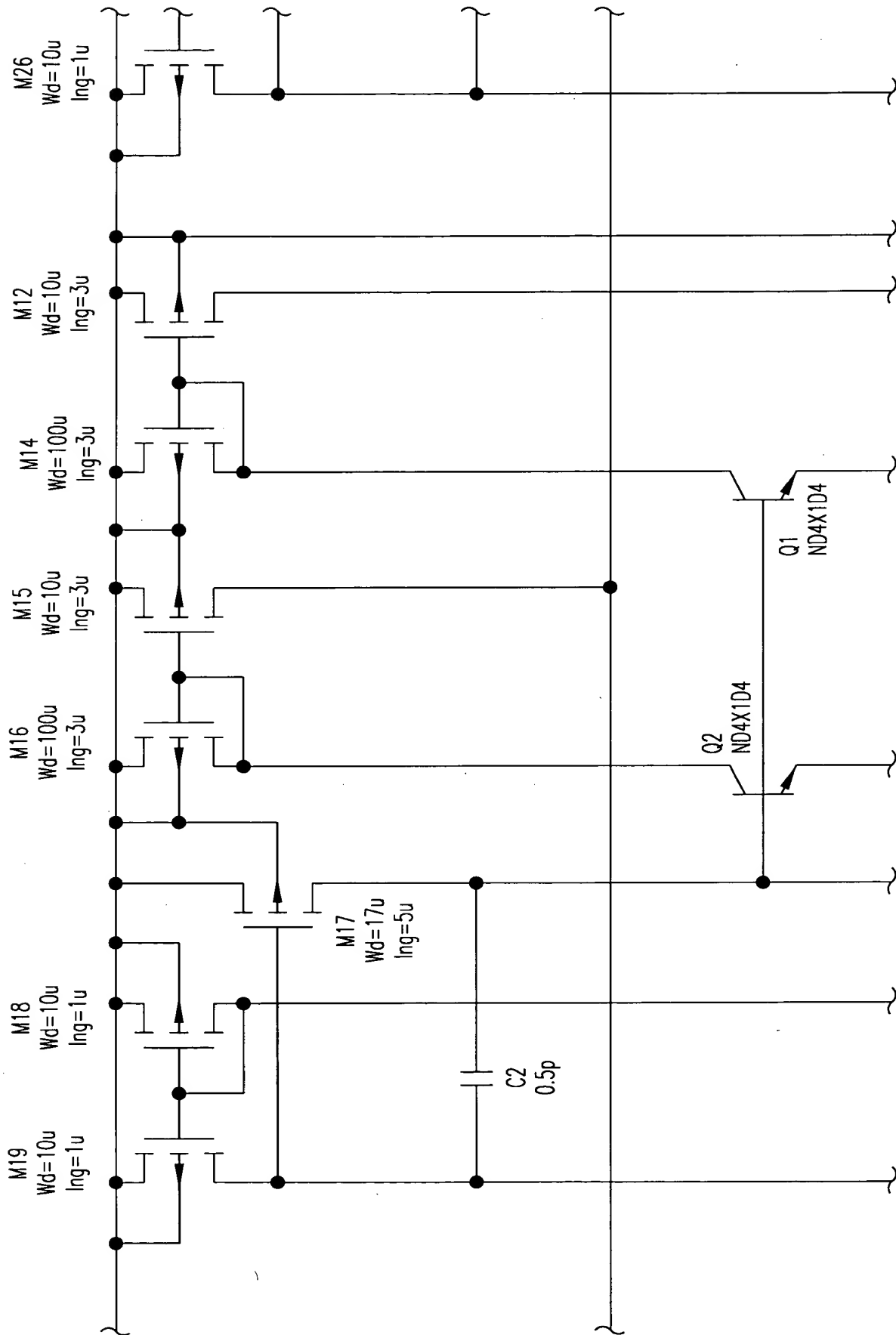


FIG. 123B

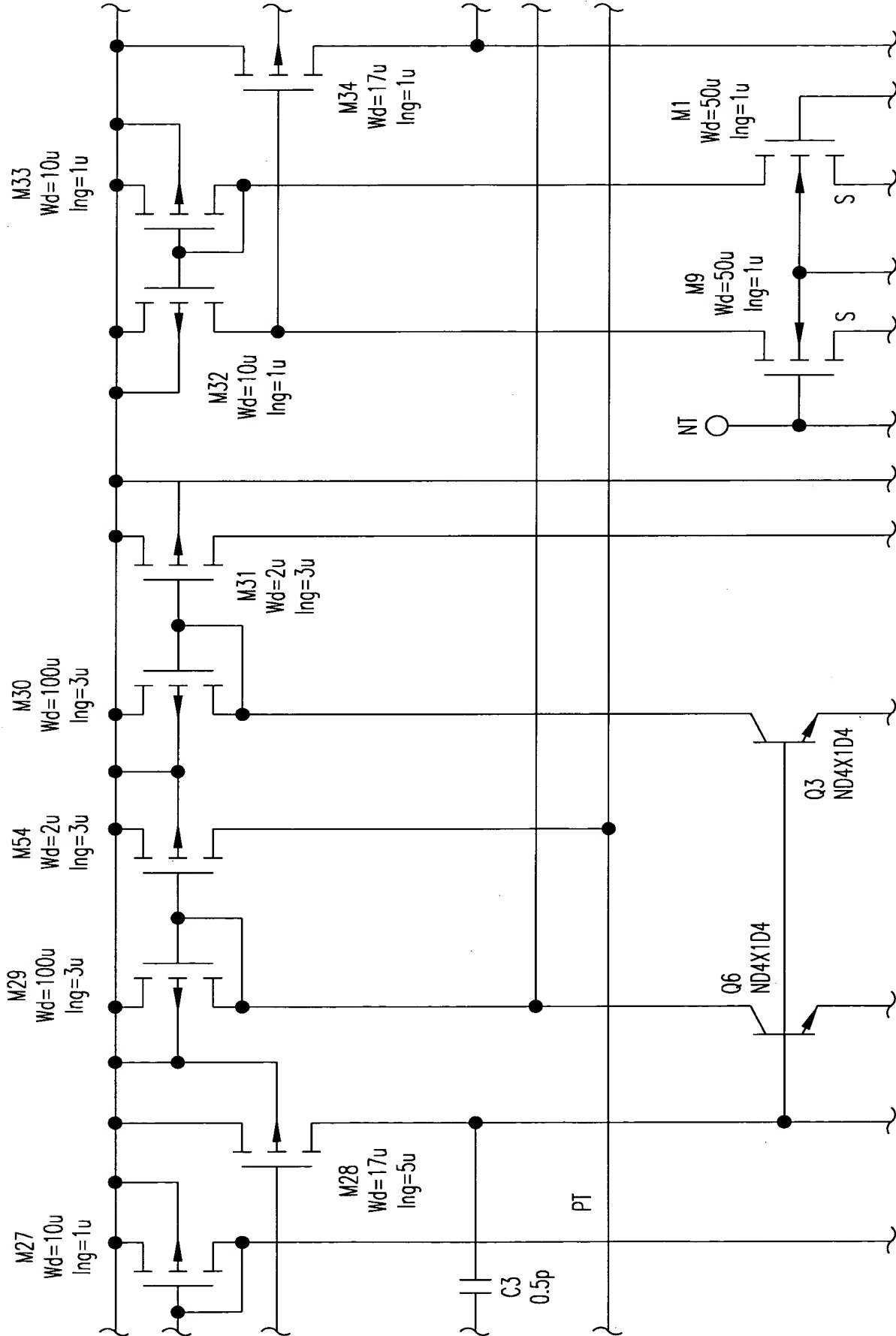


FIG. 123C



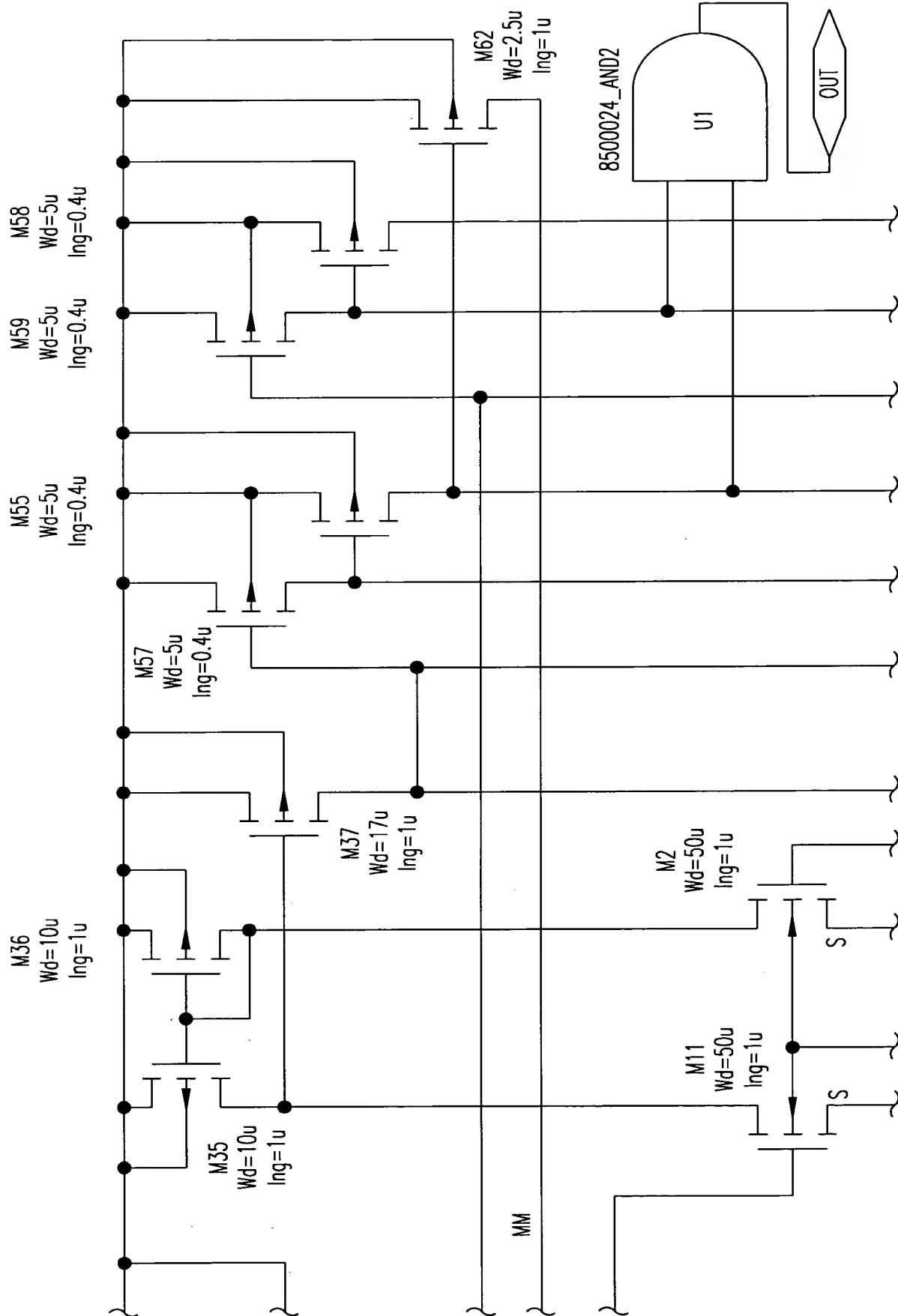
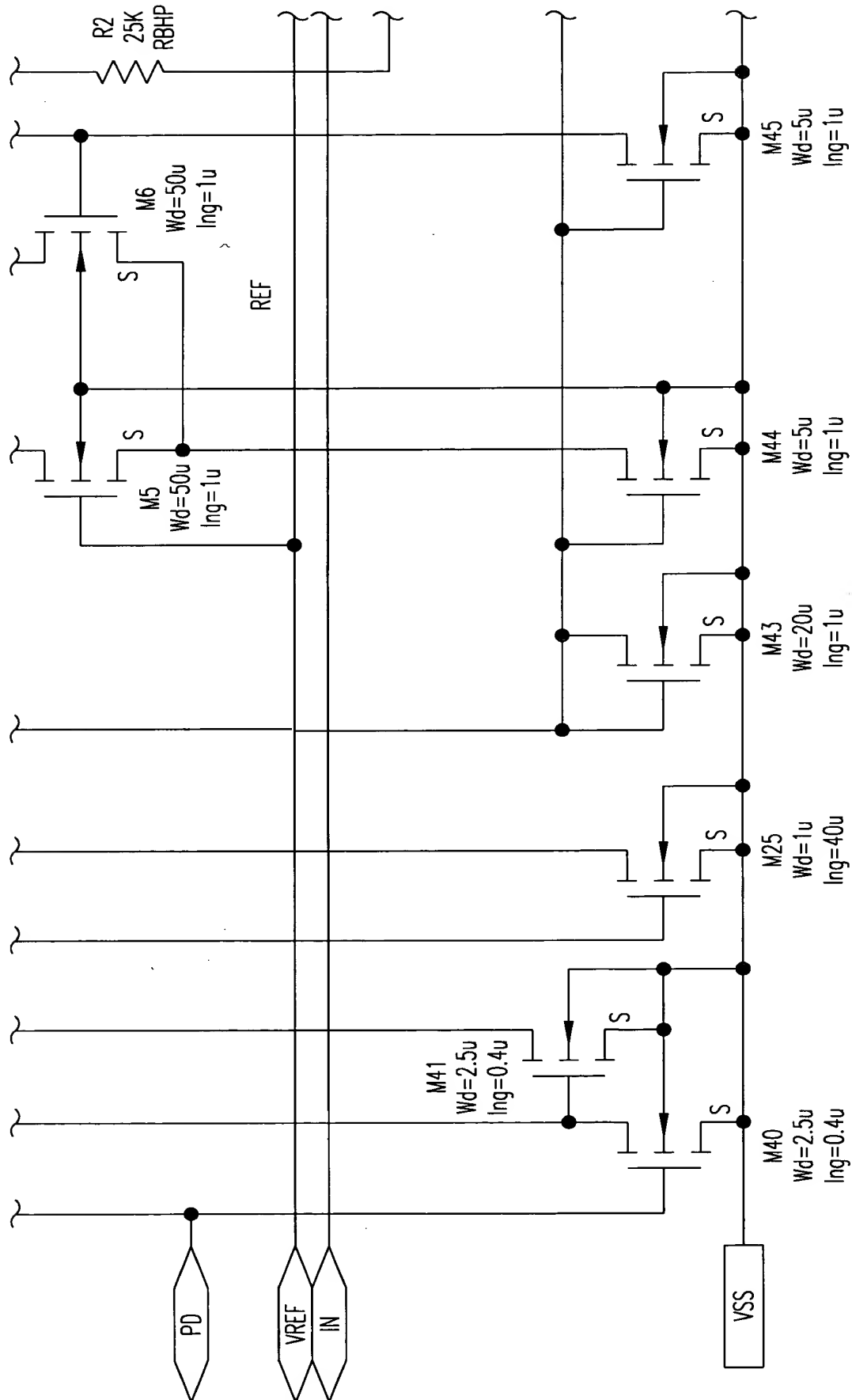


FIG. 123D



OP AMP

BIAS

2 INVERTERS

FIG.123E

FIG. 123F

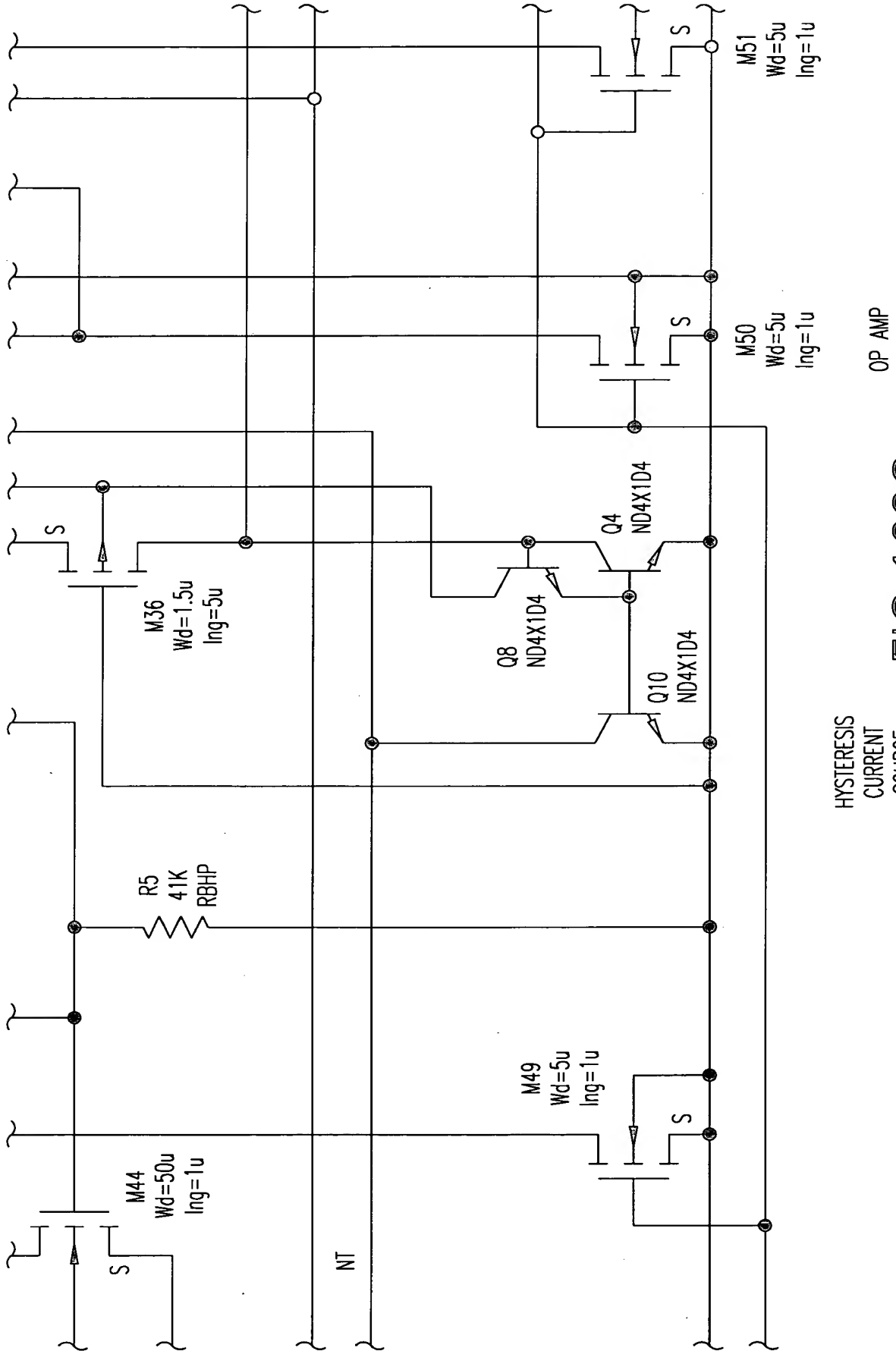


FIG. 123G

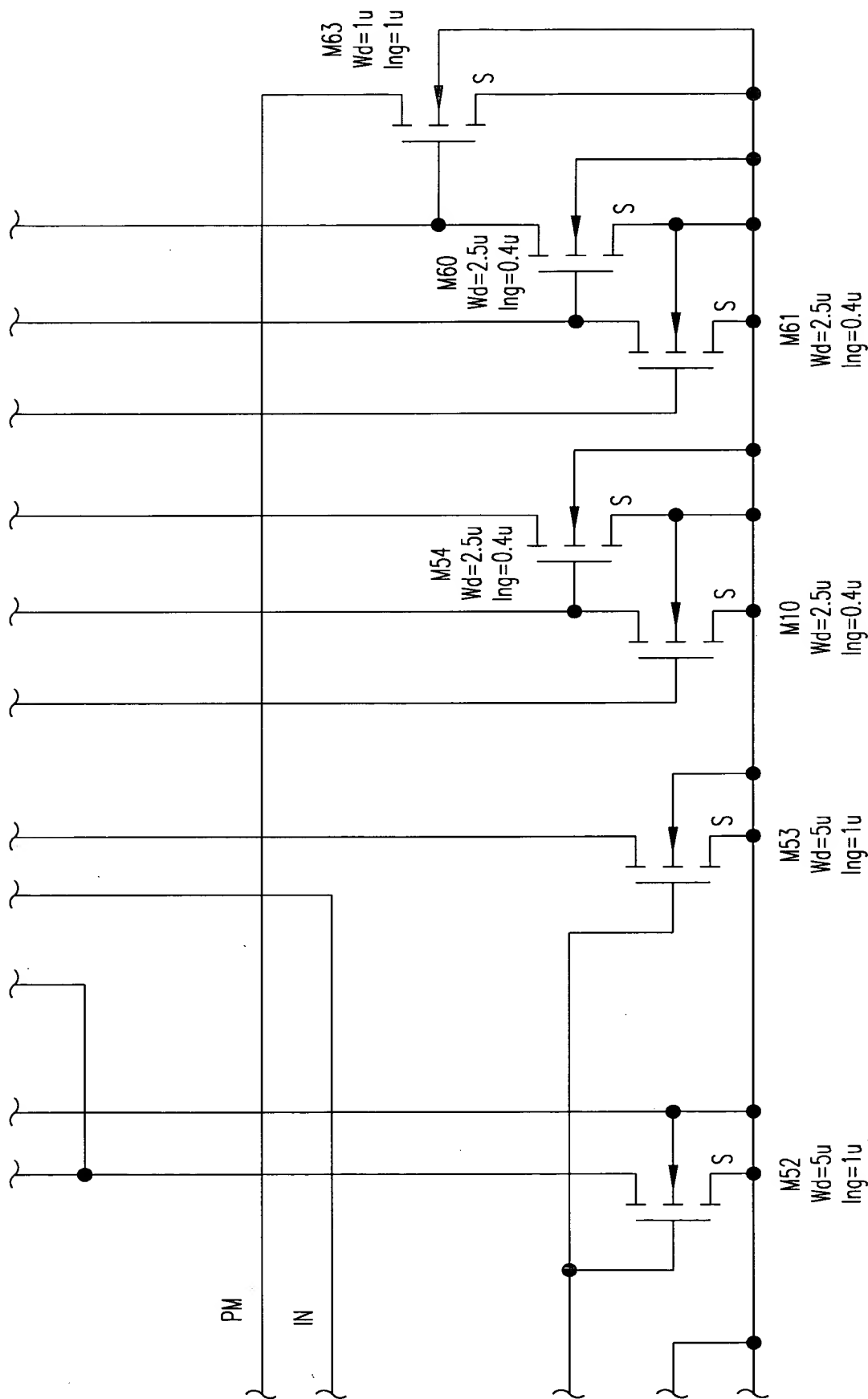


FIG. 123H

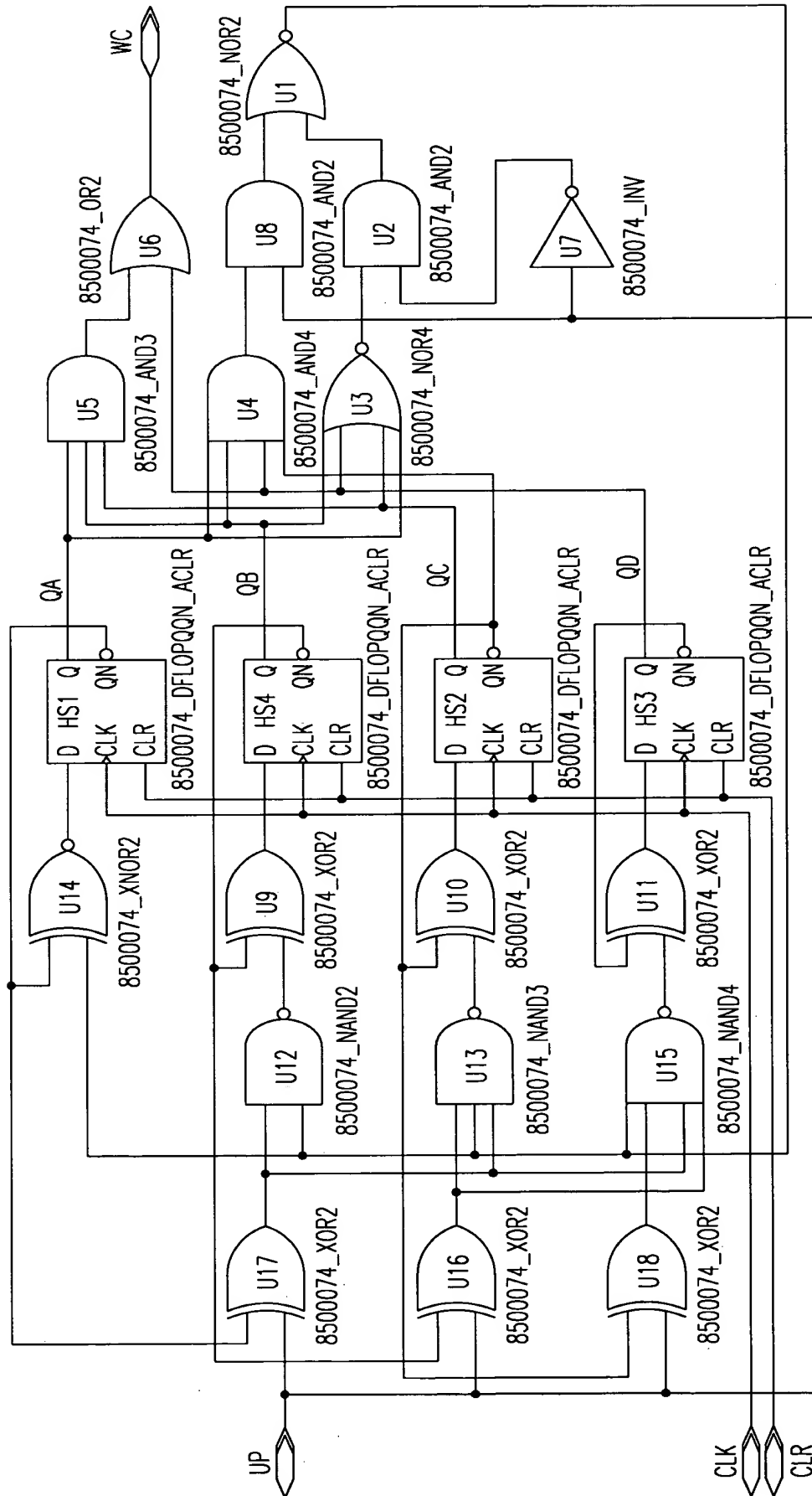


FIG.124

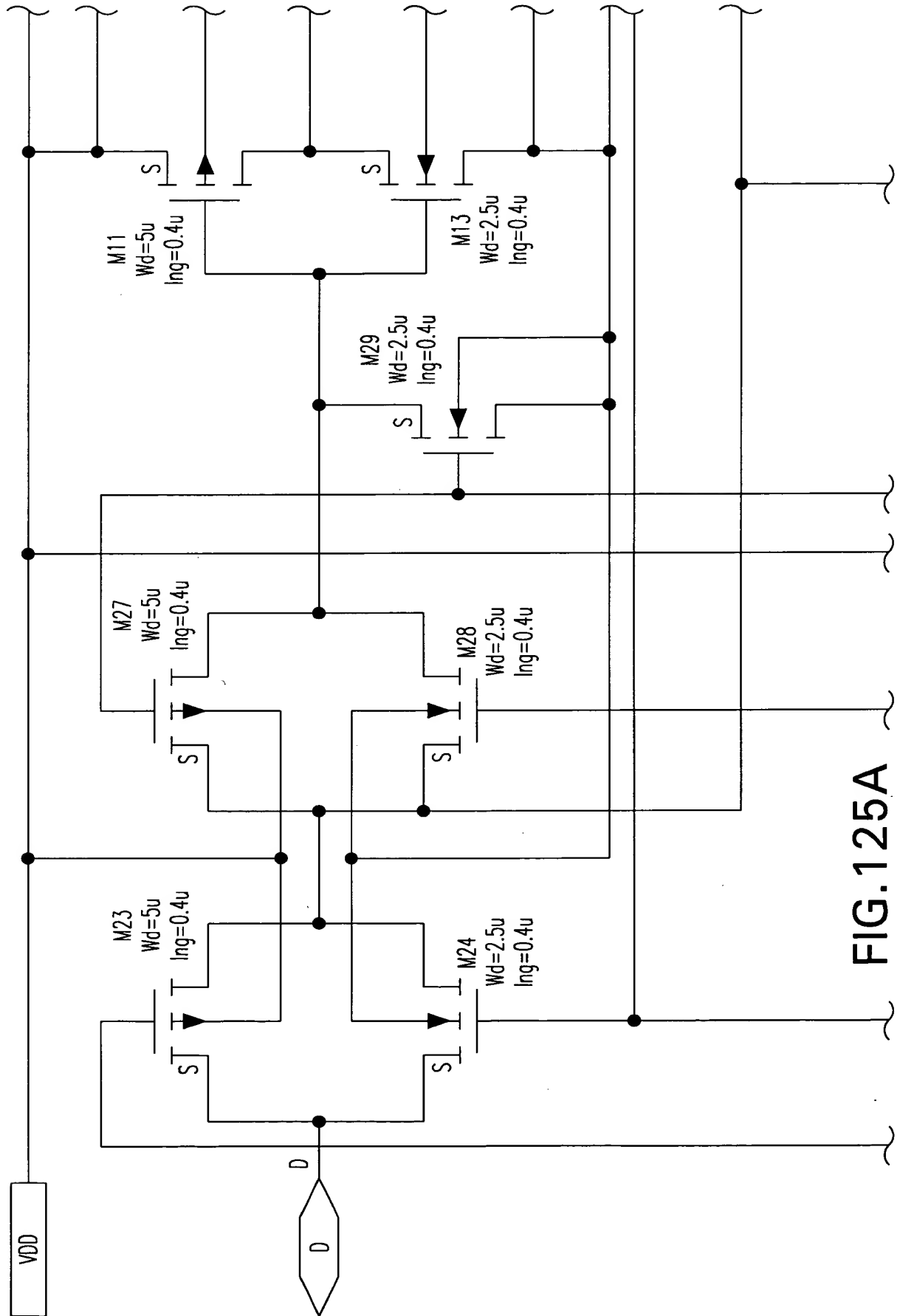


FIG. 125A

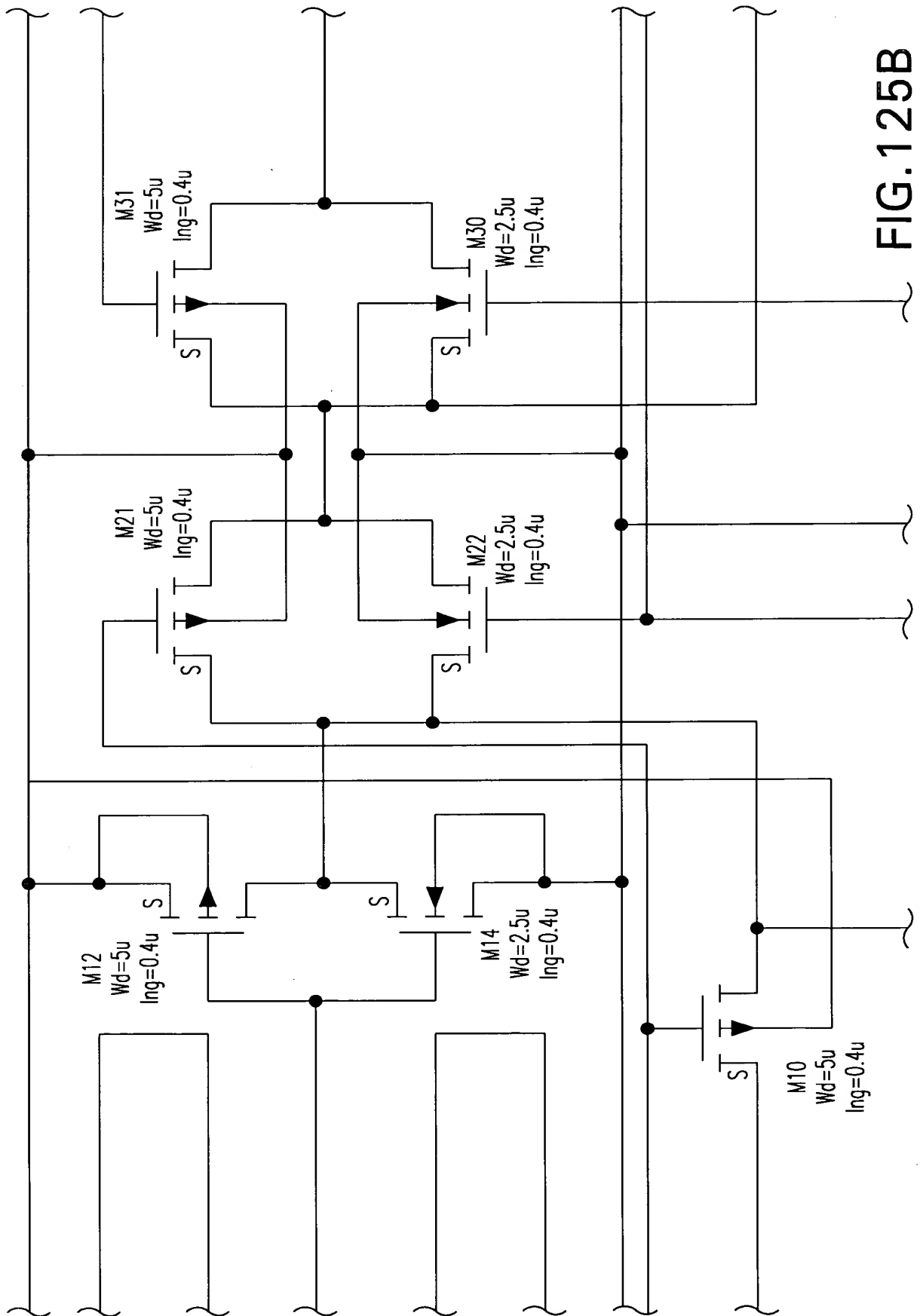


FIG. 125B



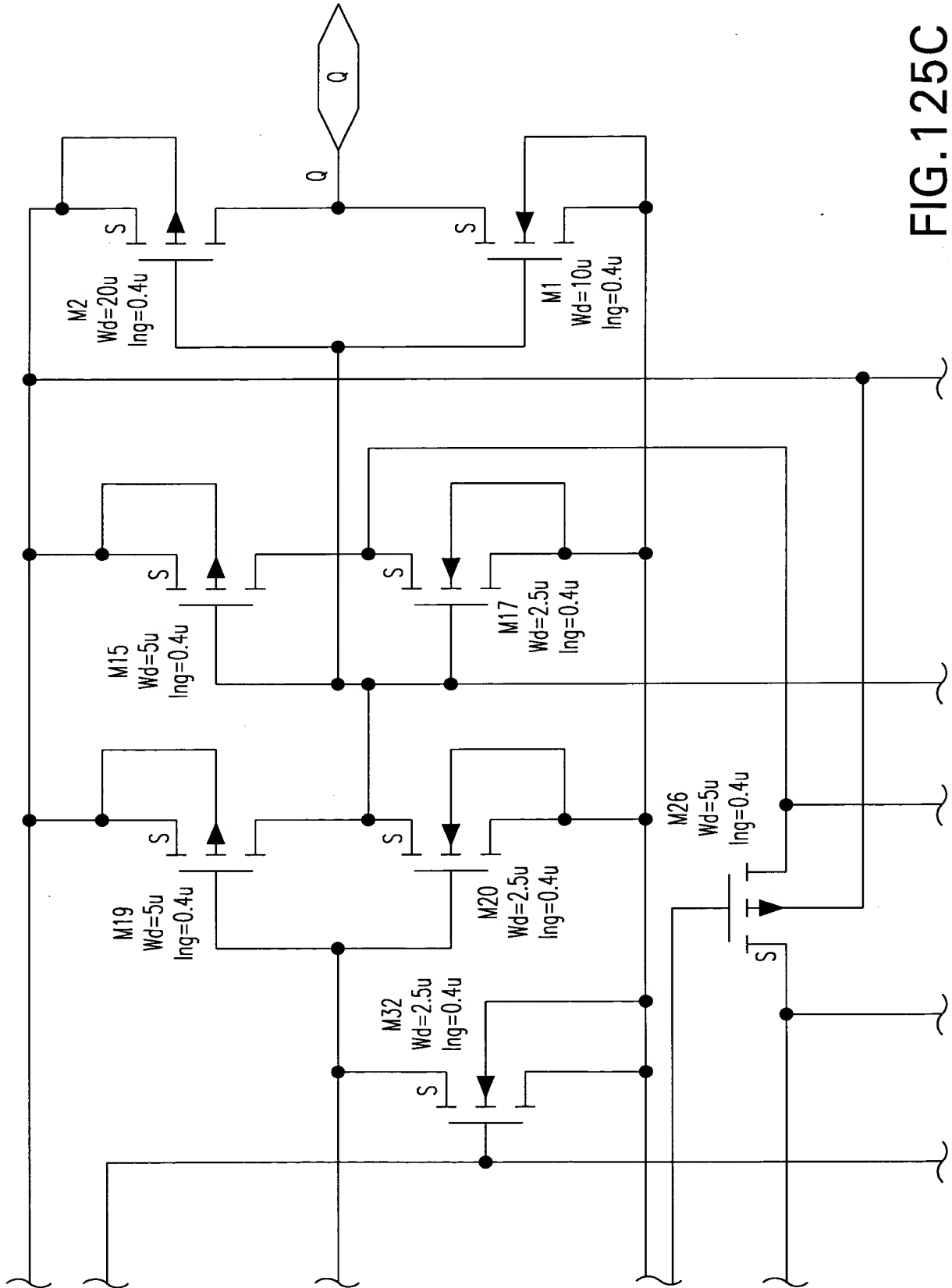


FIG. 125C

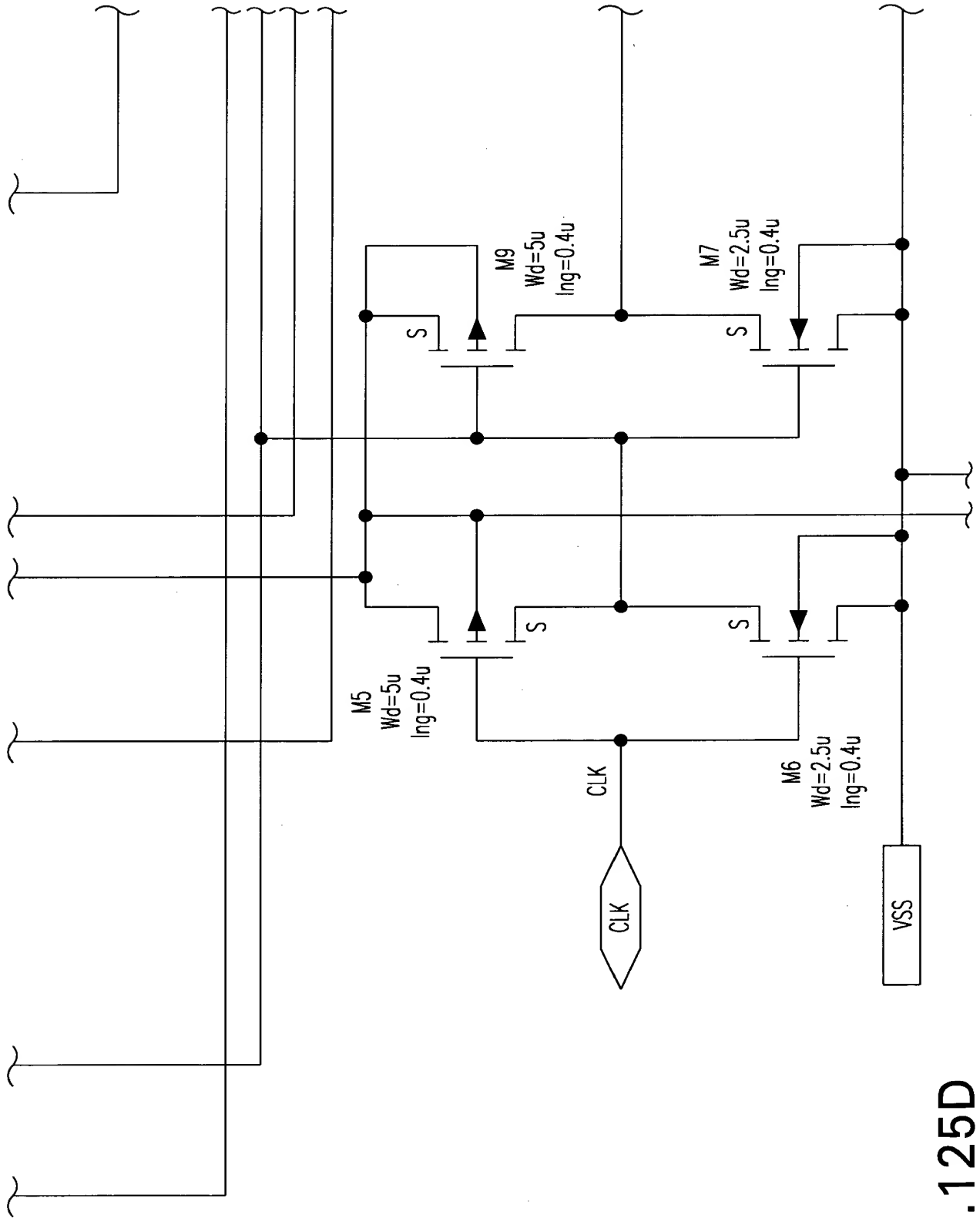
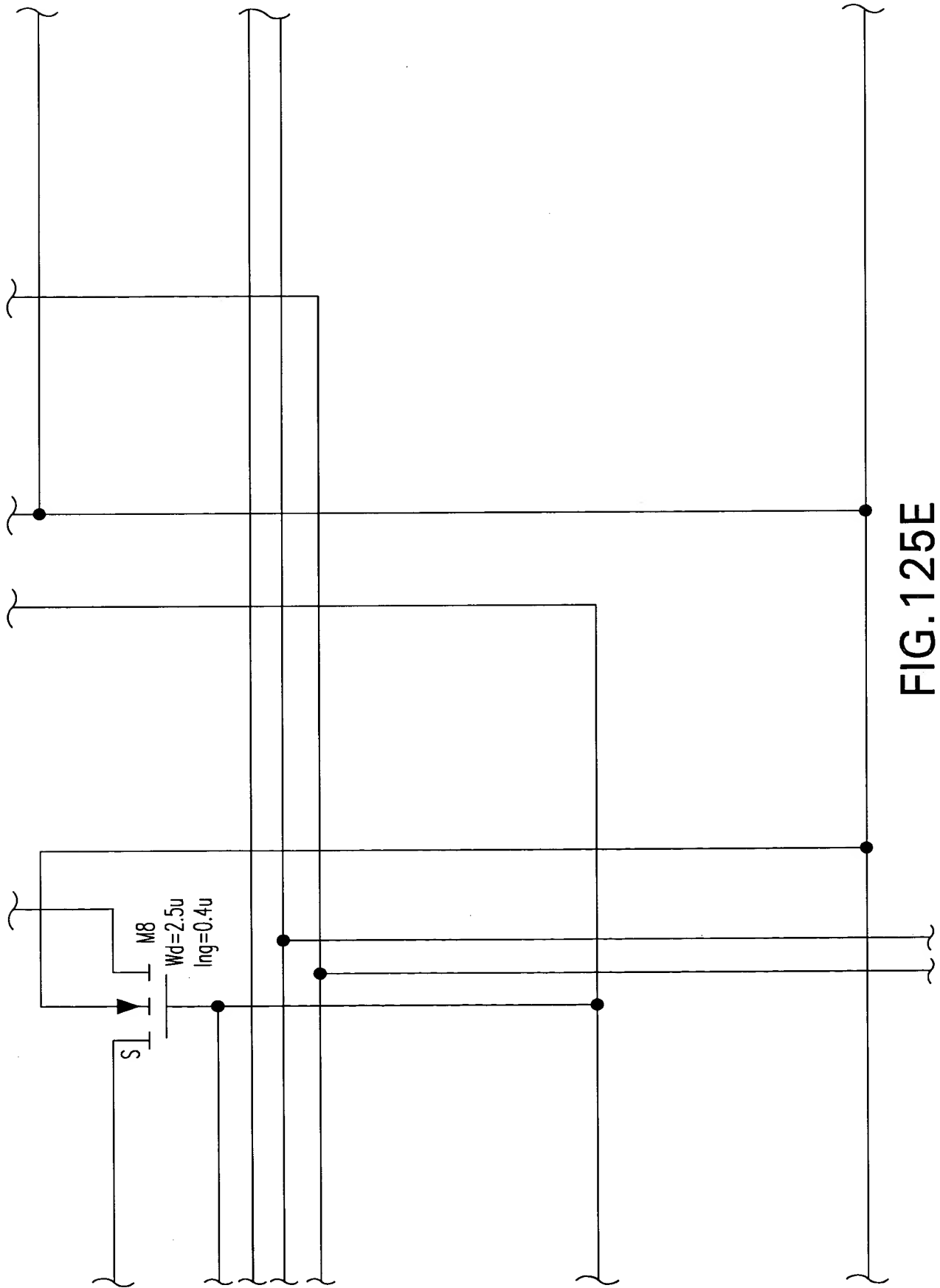


FIG. 125D



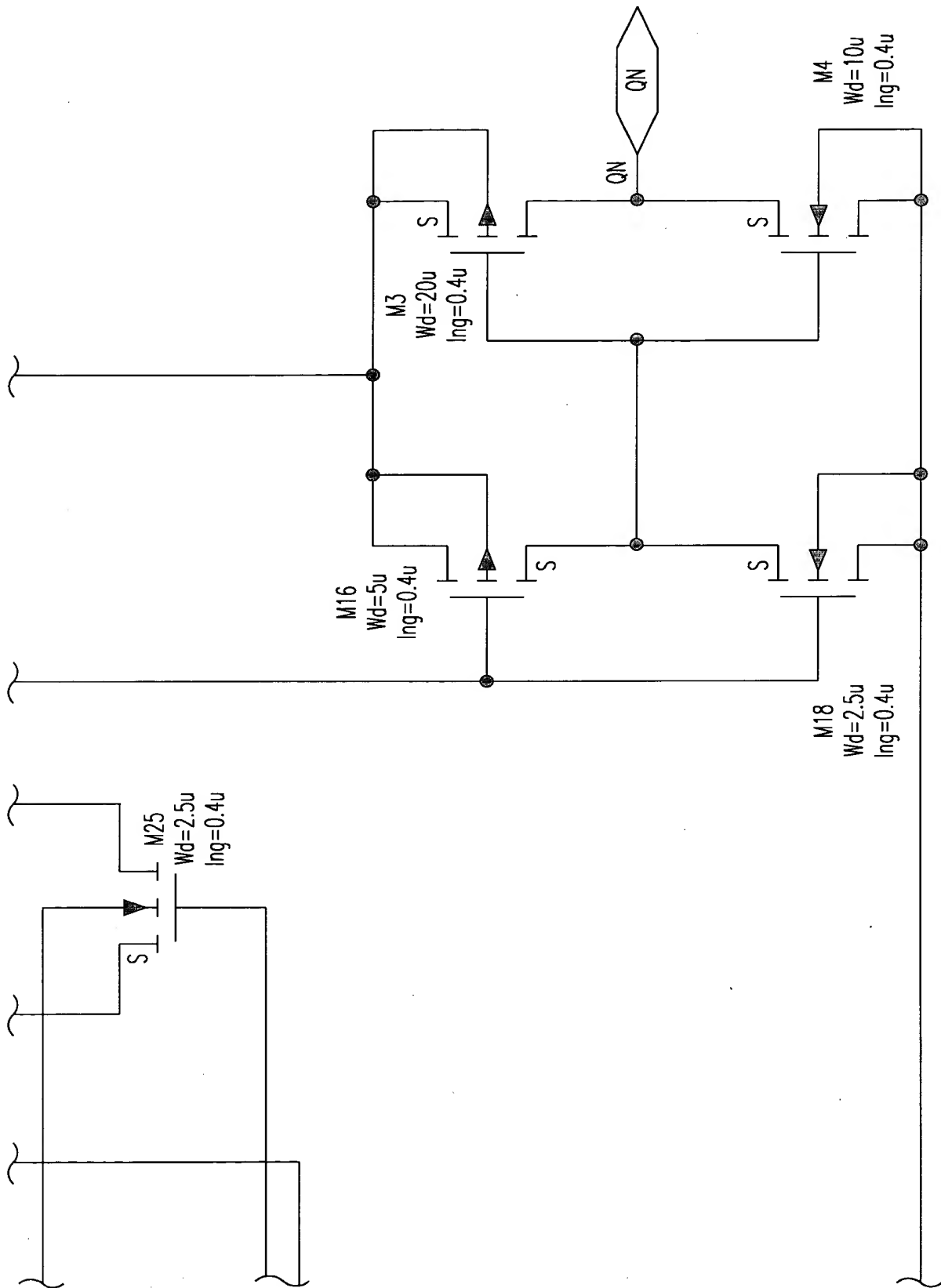


FIG. 125F

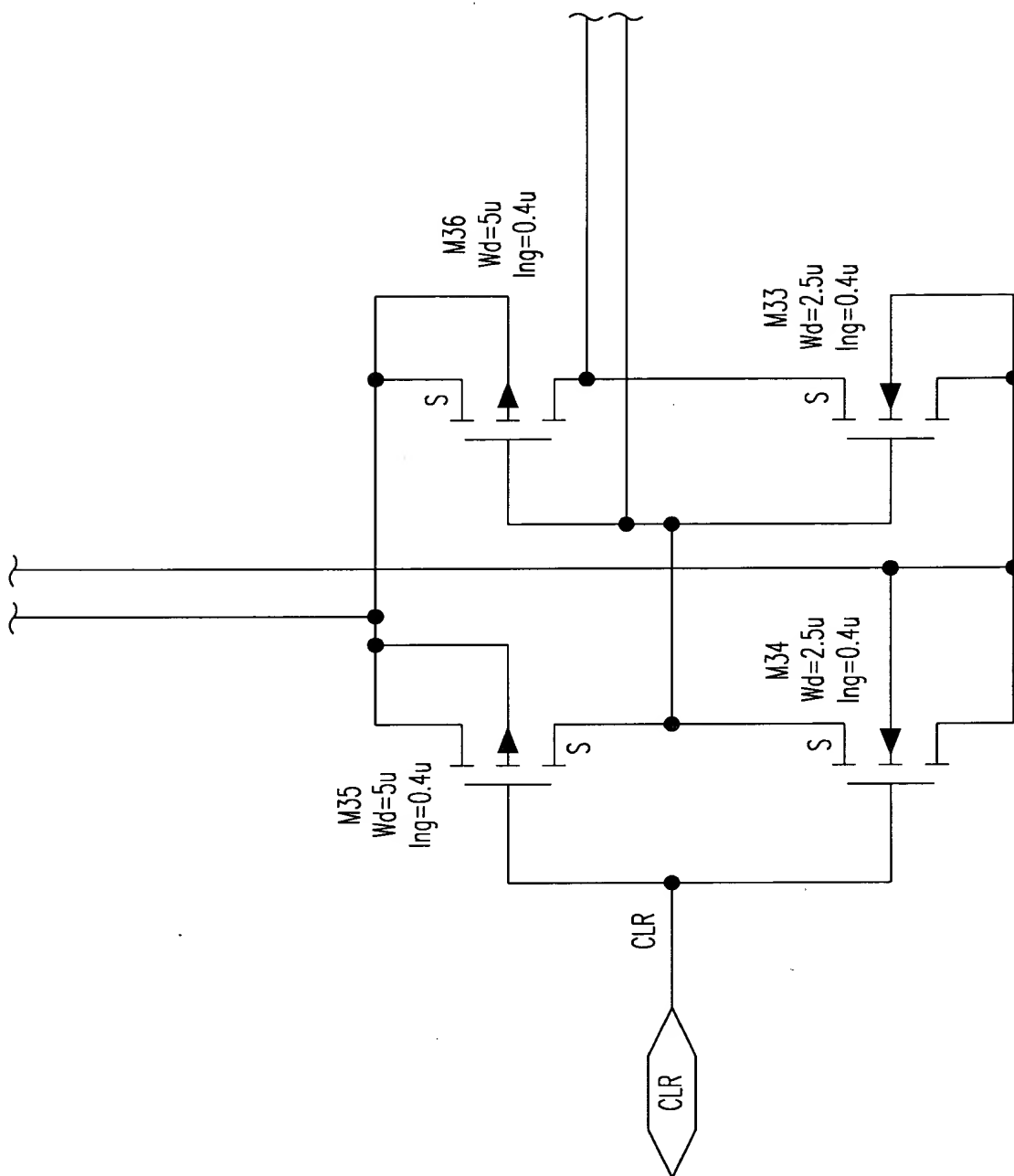
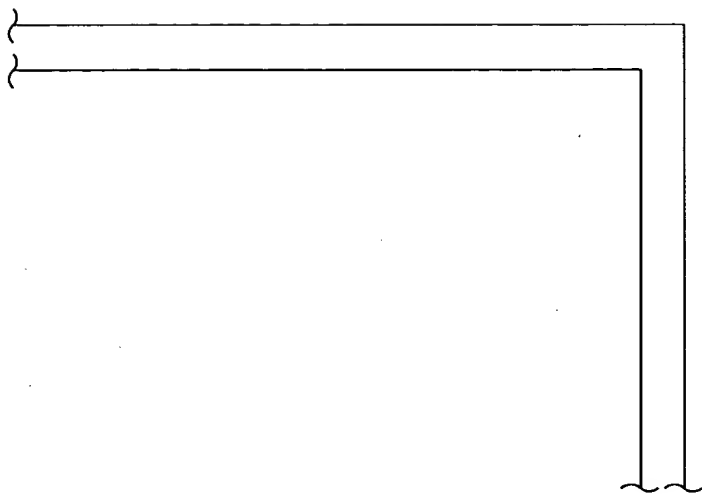
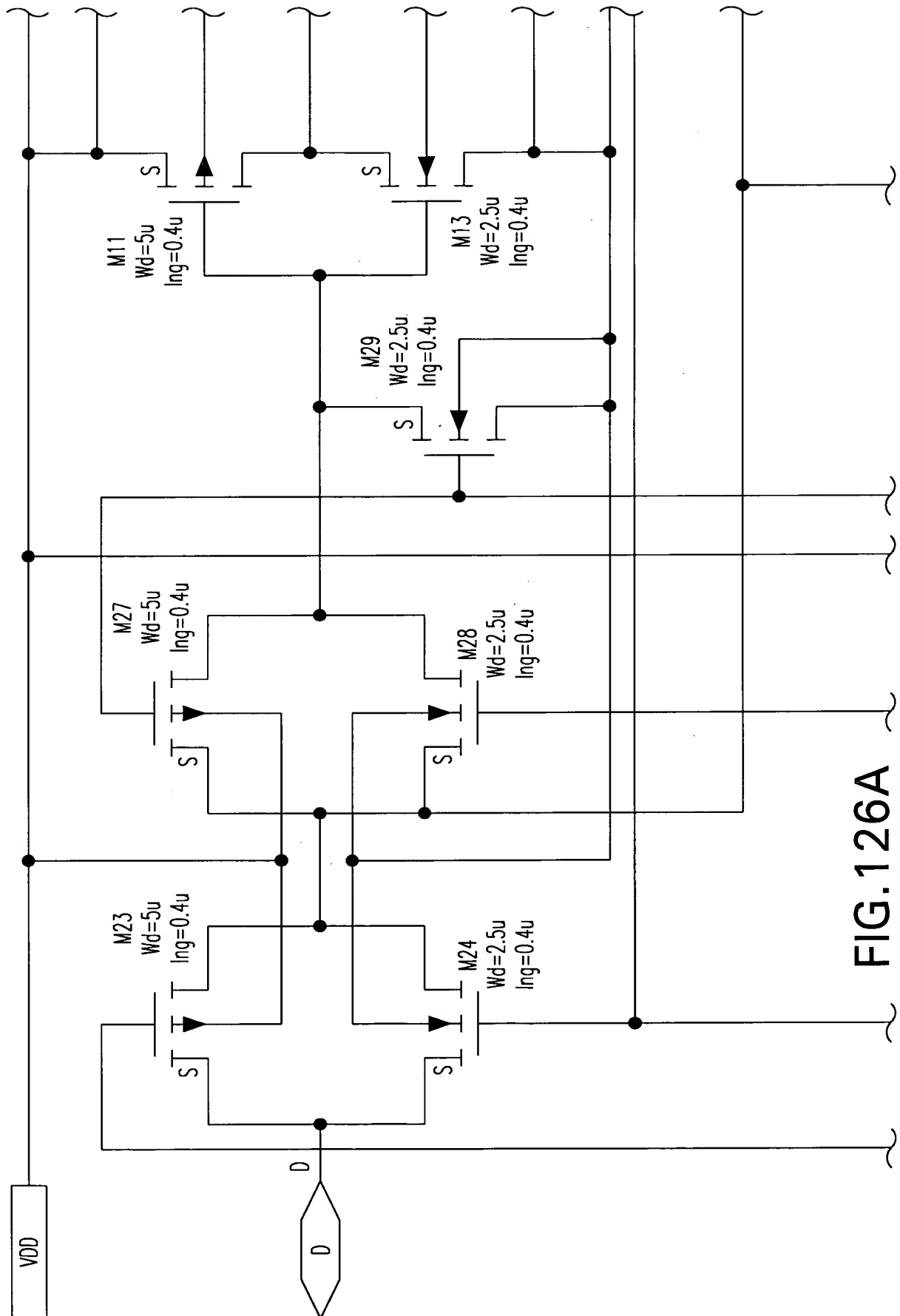
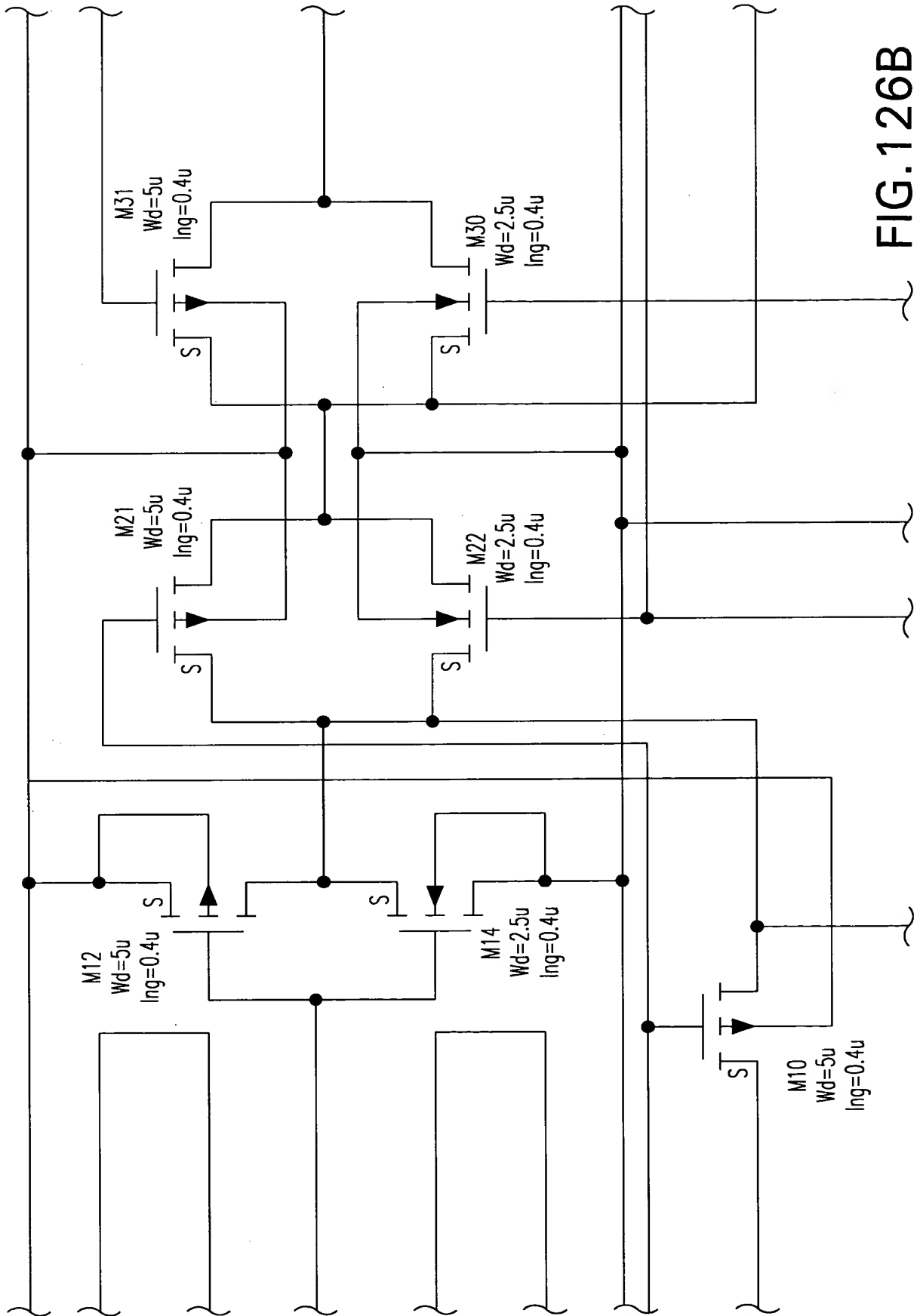


FIG. 125G

FIG. 125H









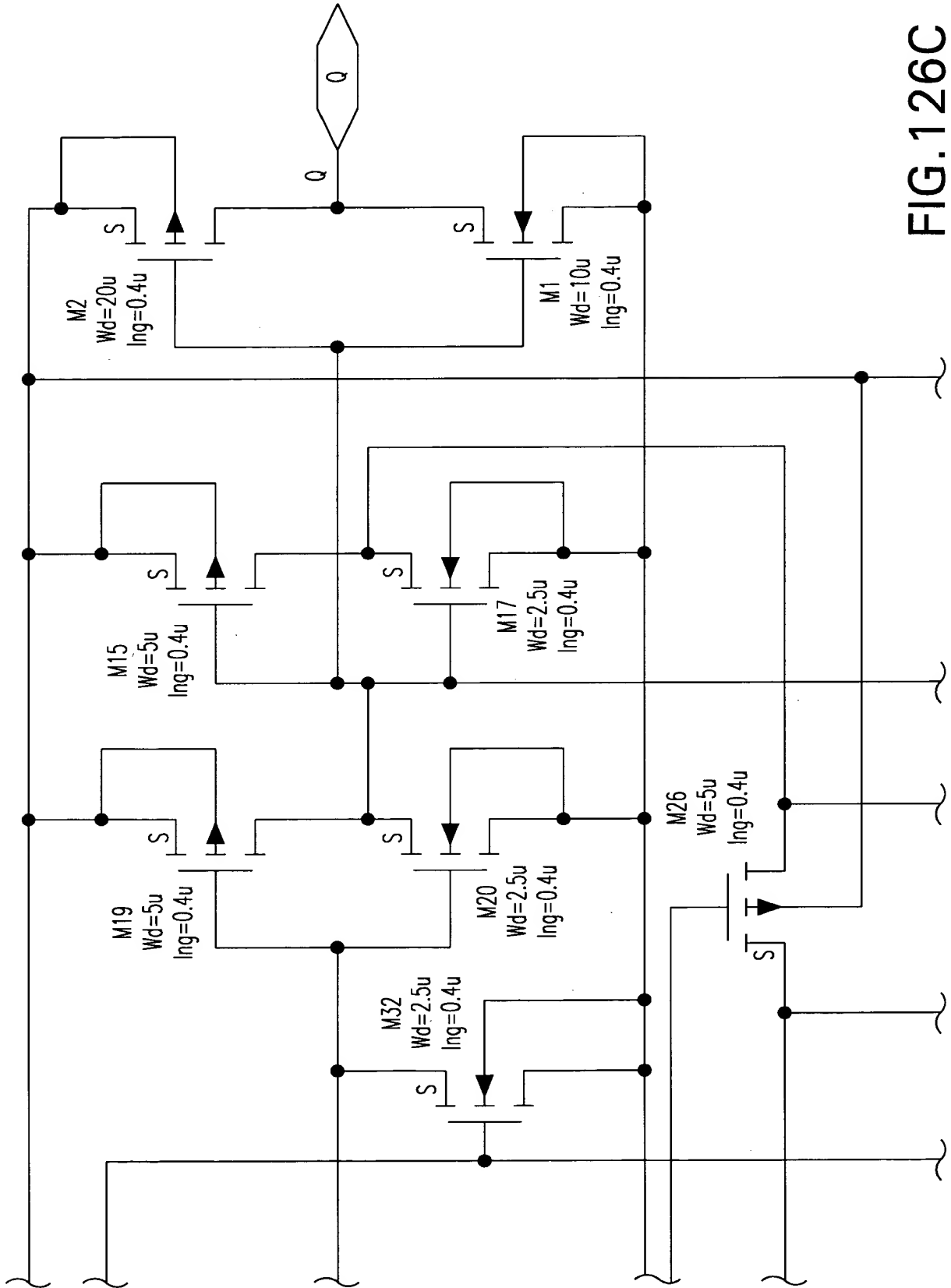


FIG. 126C

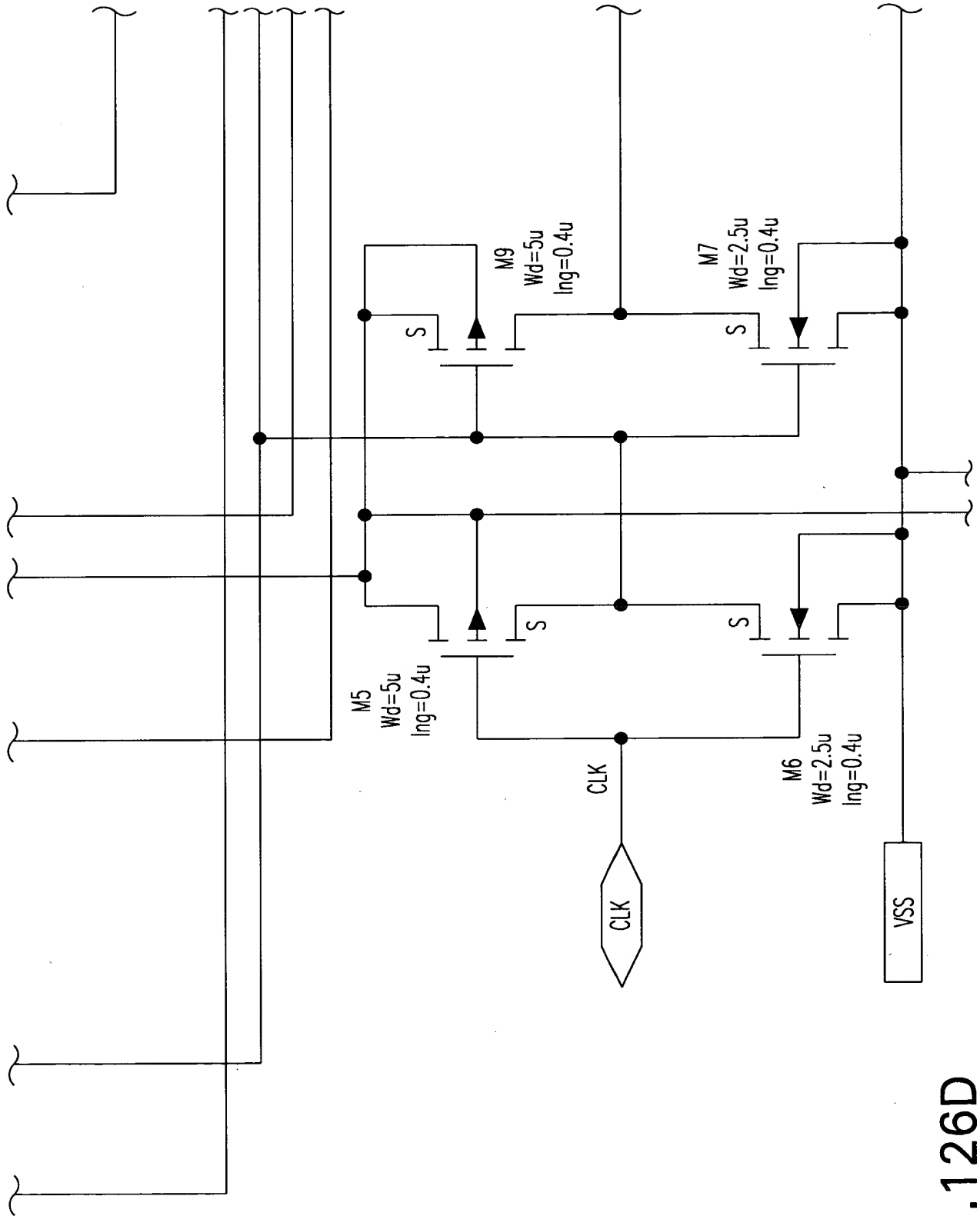


FIG. 126D



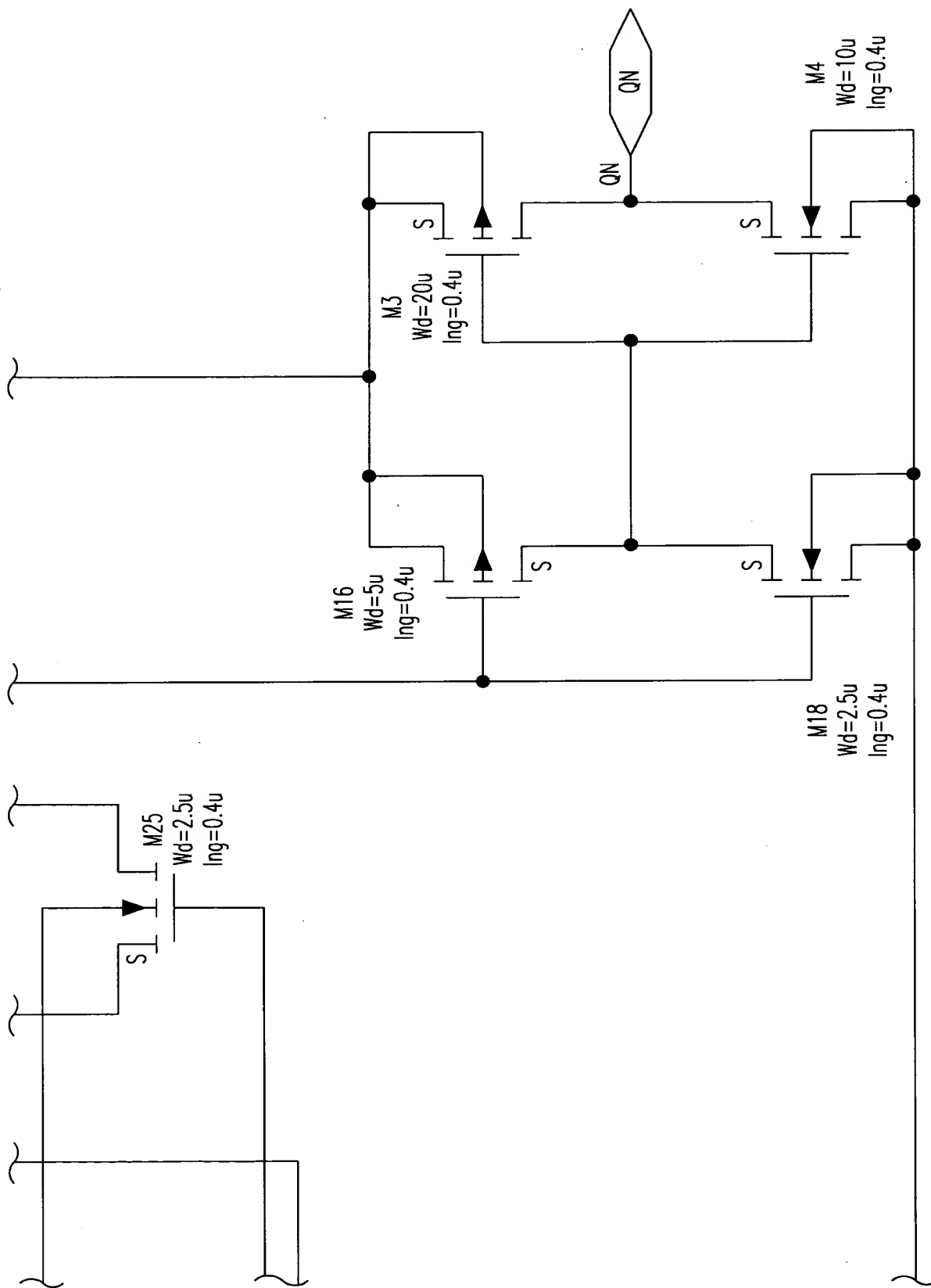
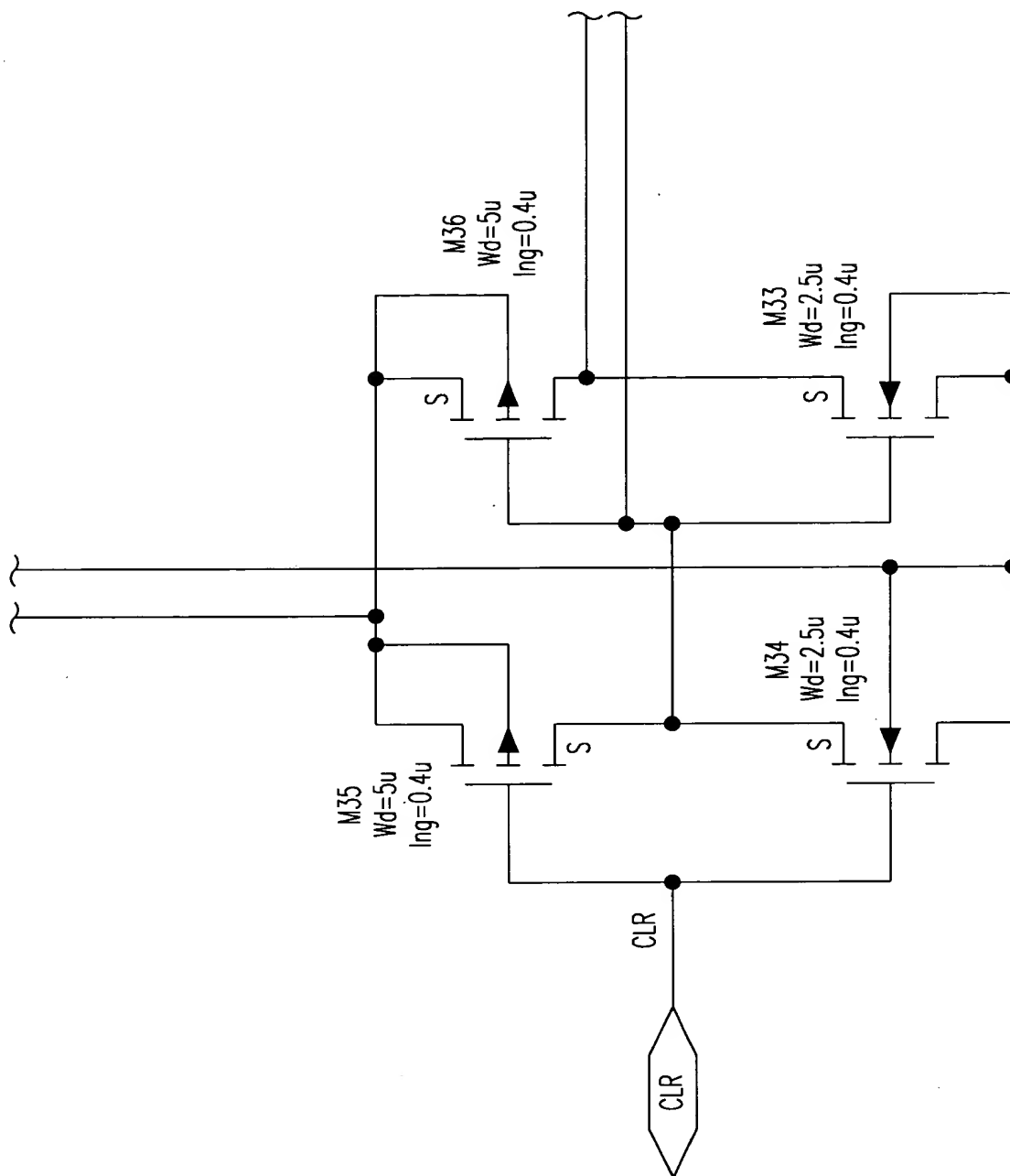


FIG. 126F



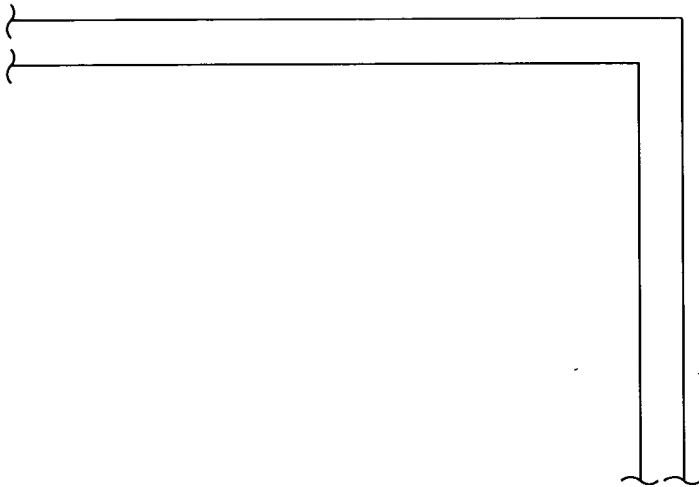


FIG. 126H

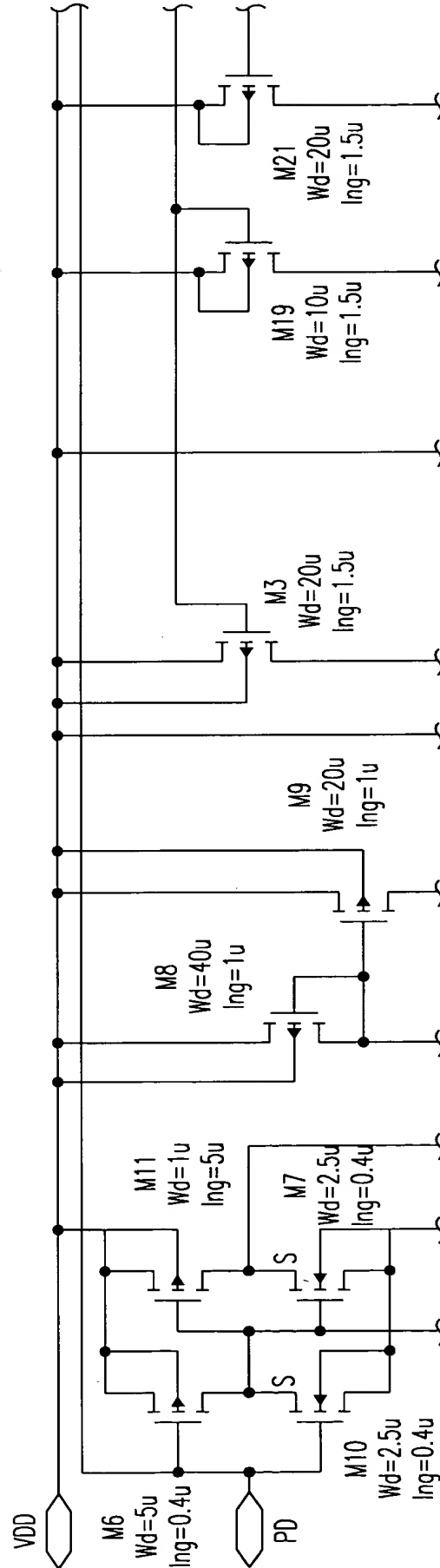


FIG. 127A

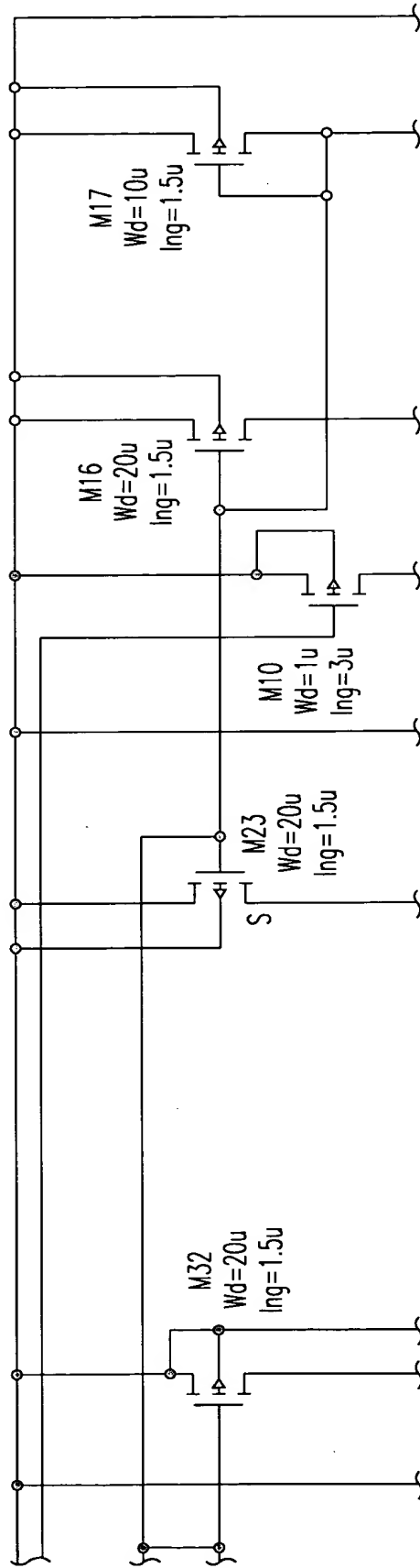


FIG. 127B



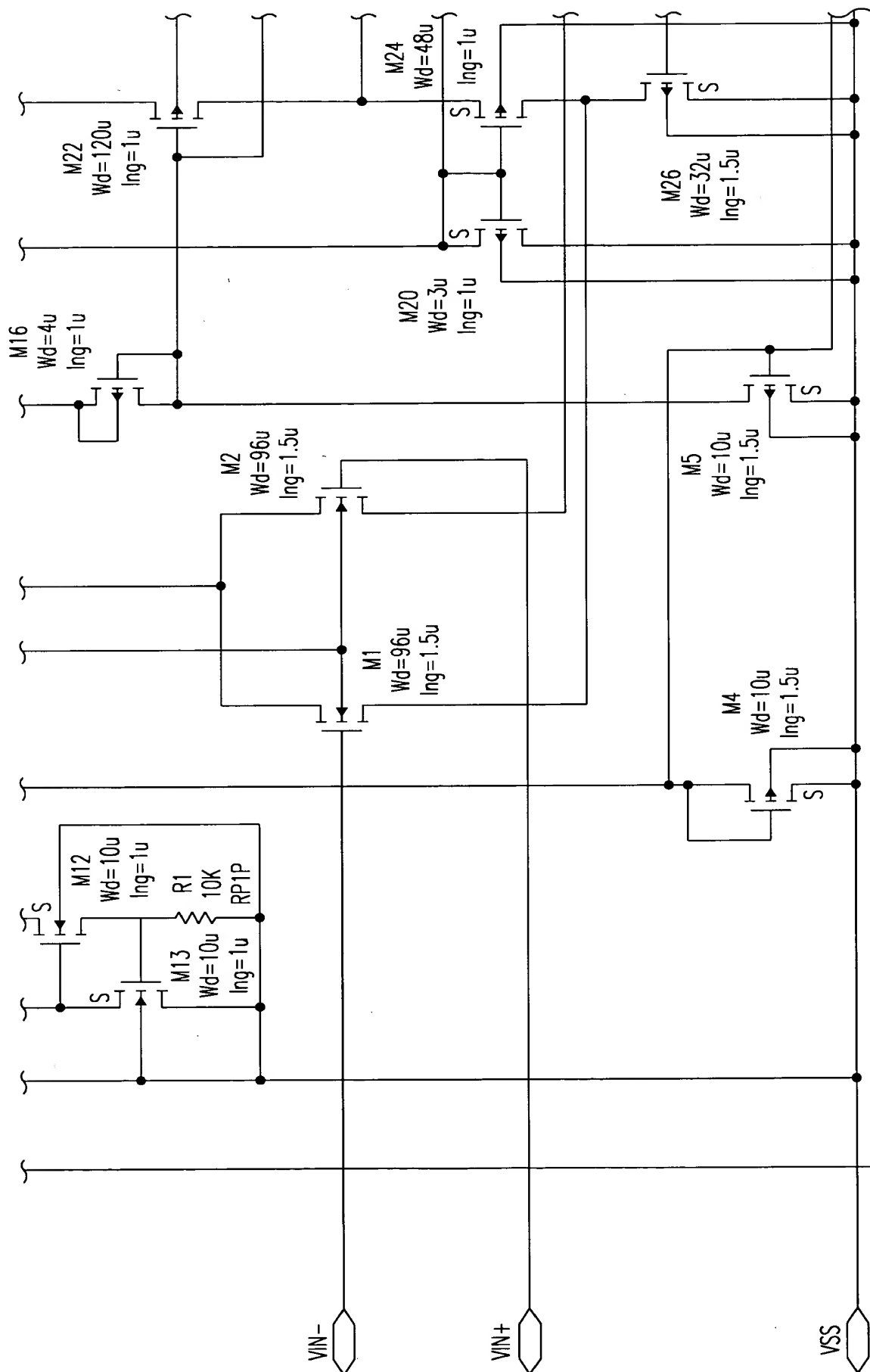


FIG. 127C

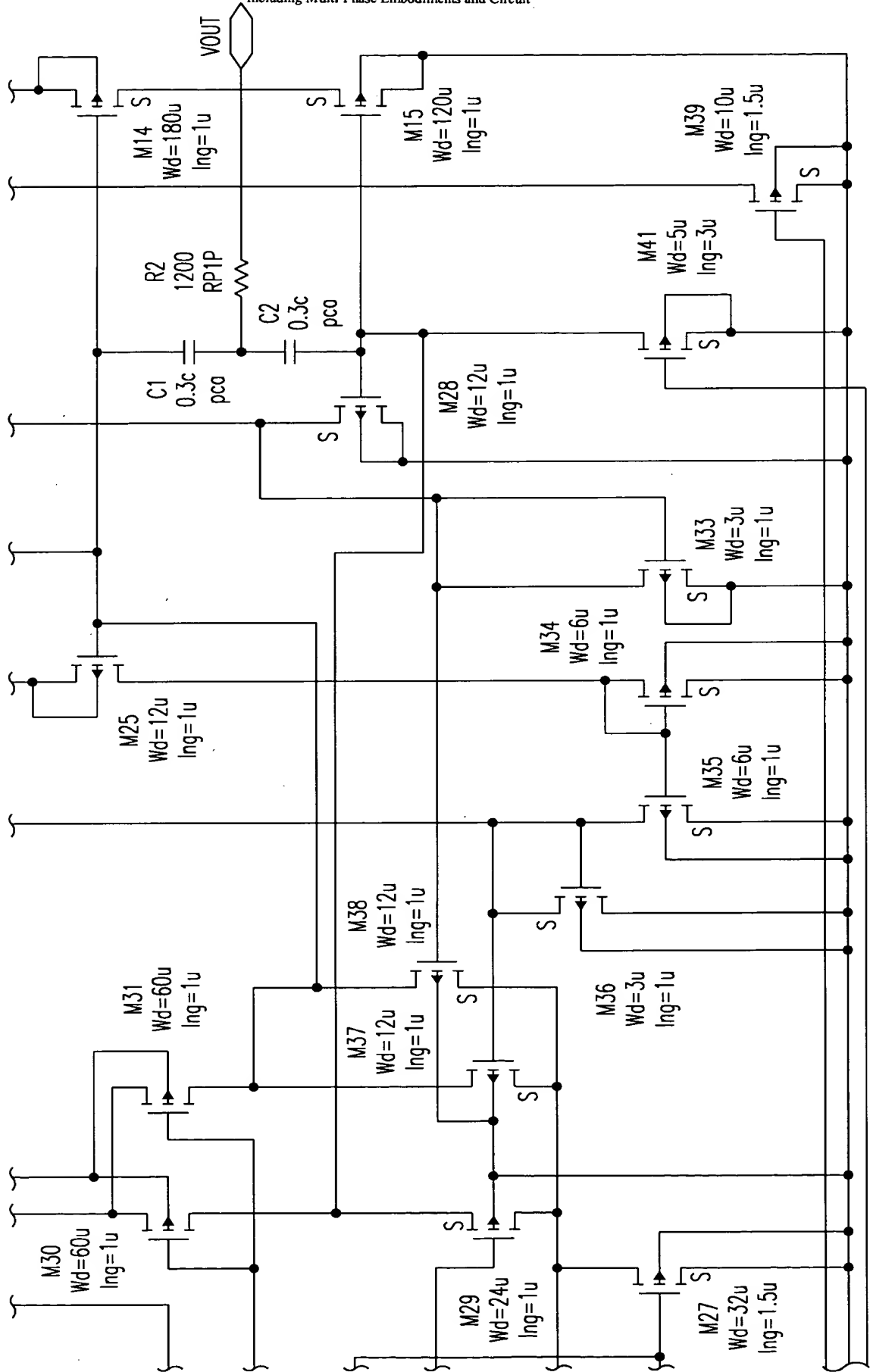


FIG. 127D

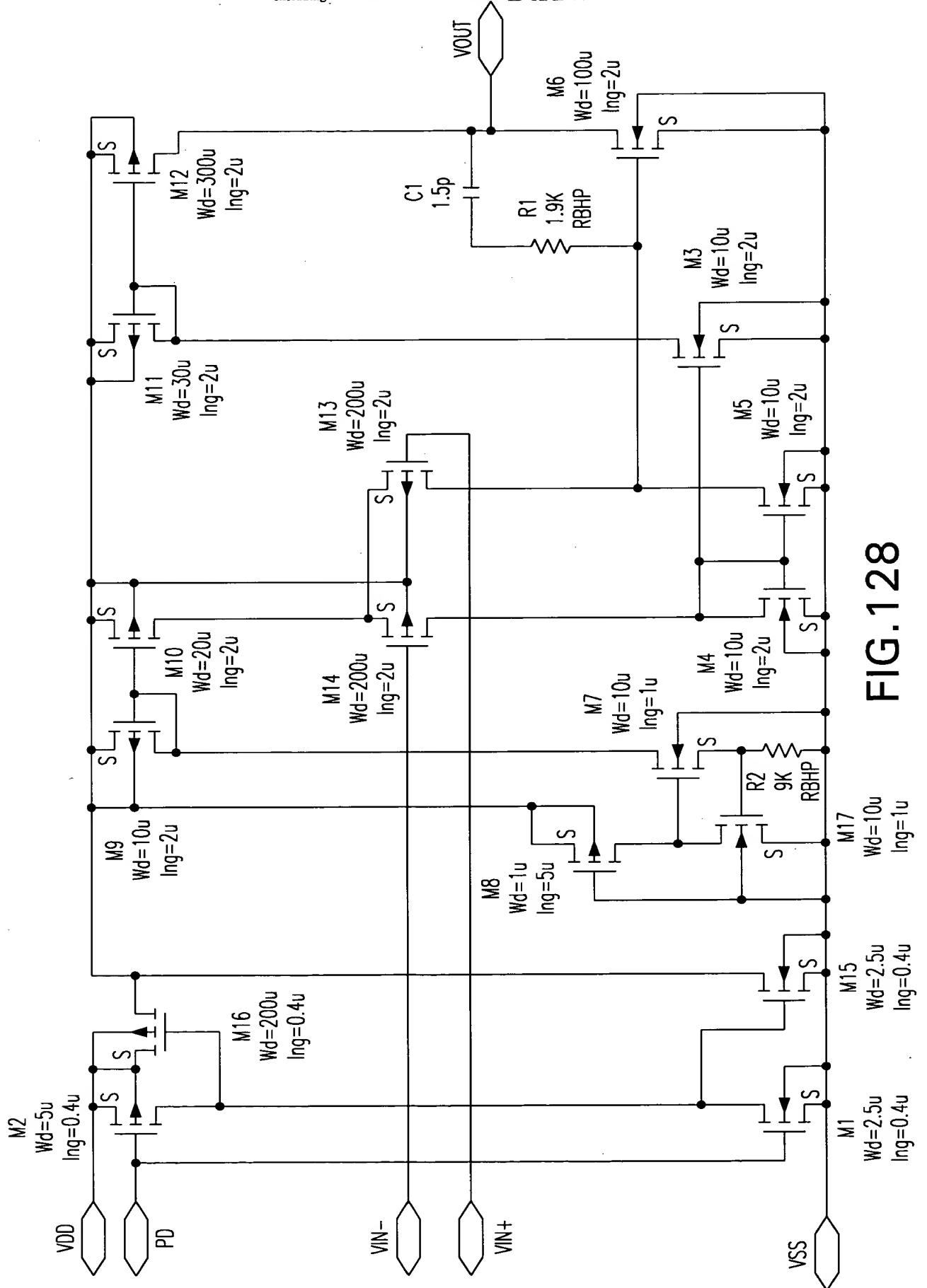


FIG. 128

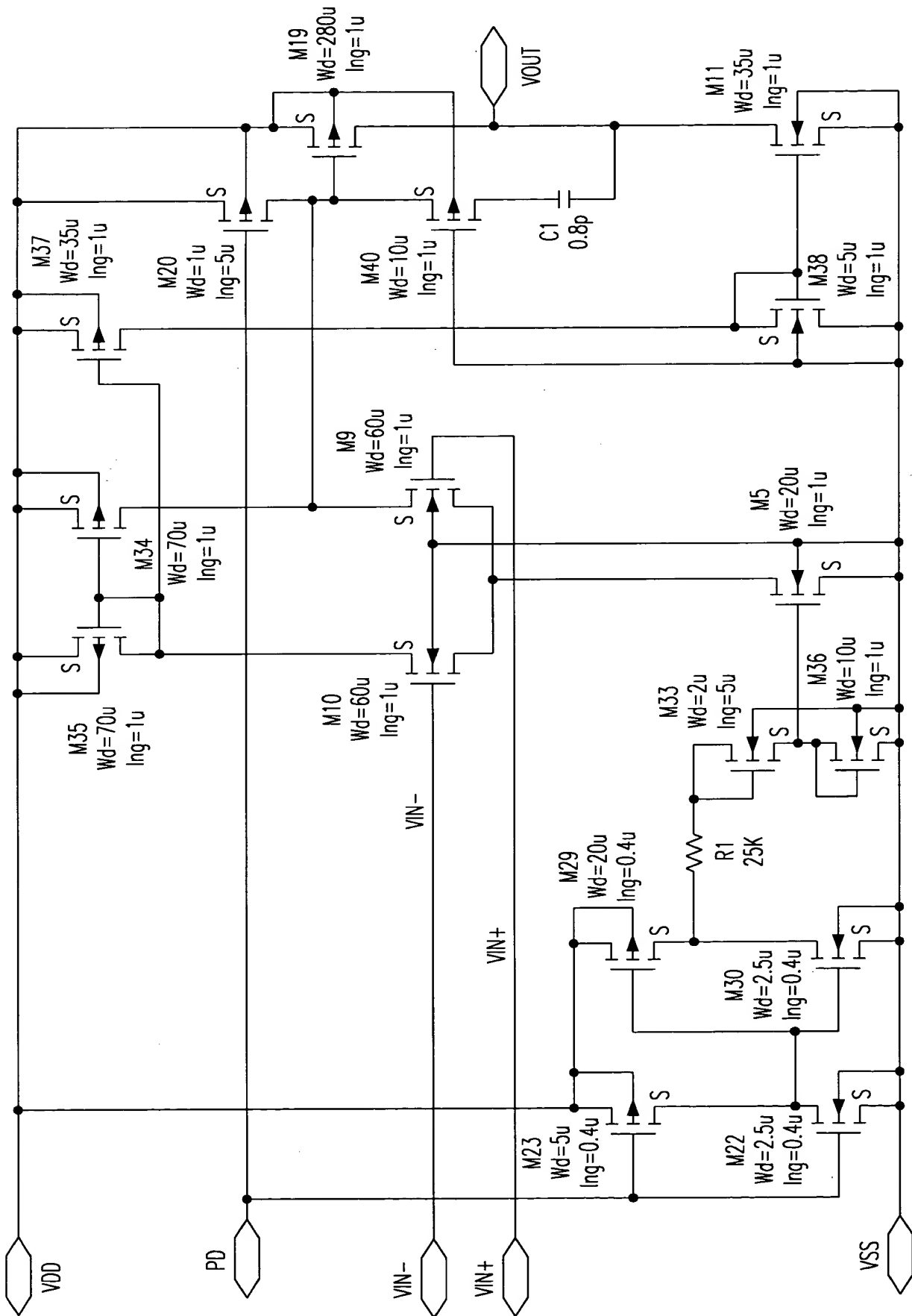


FIG. 129

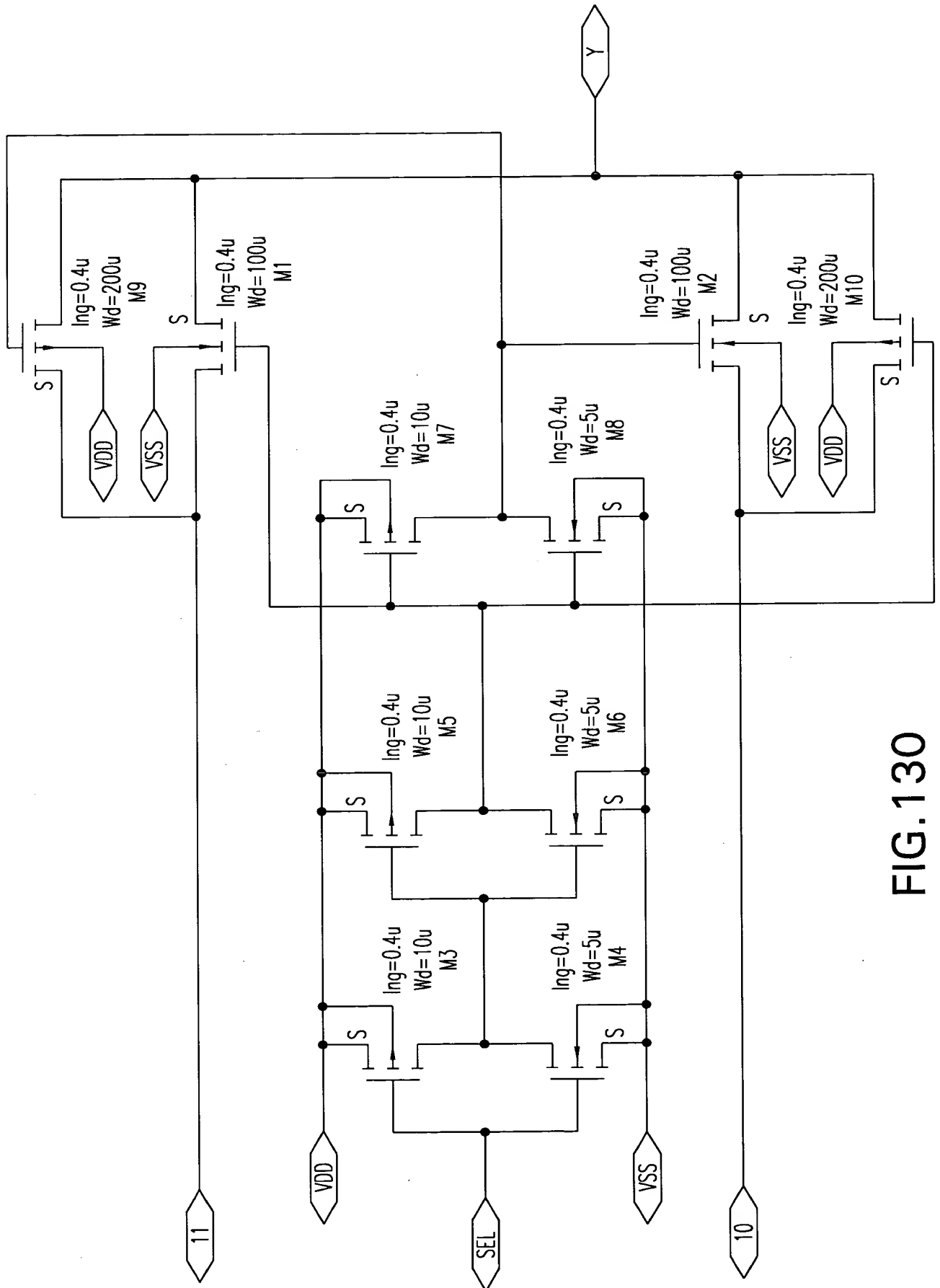


FIG. 130

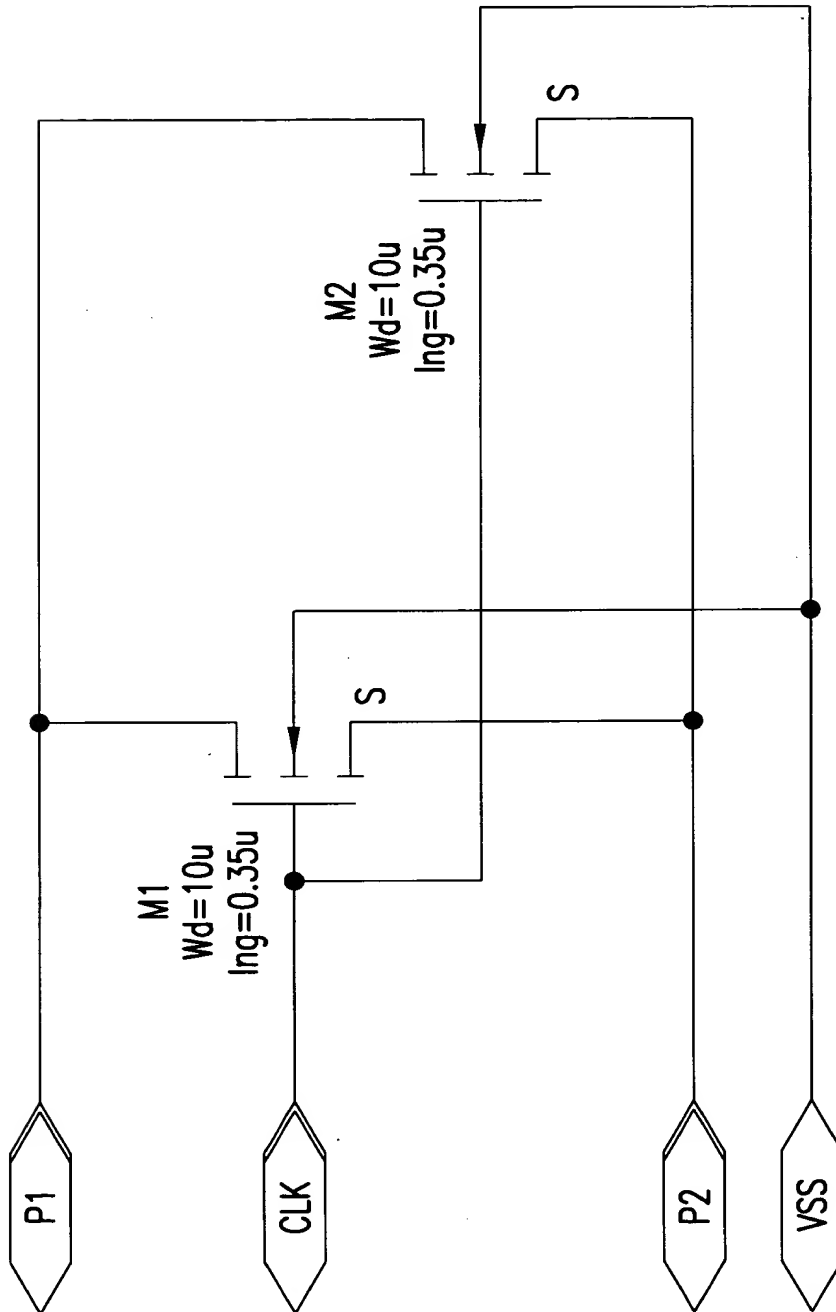


FIG. 131

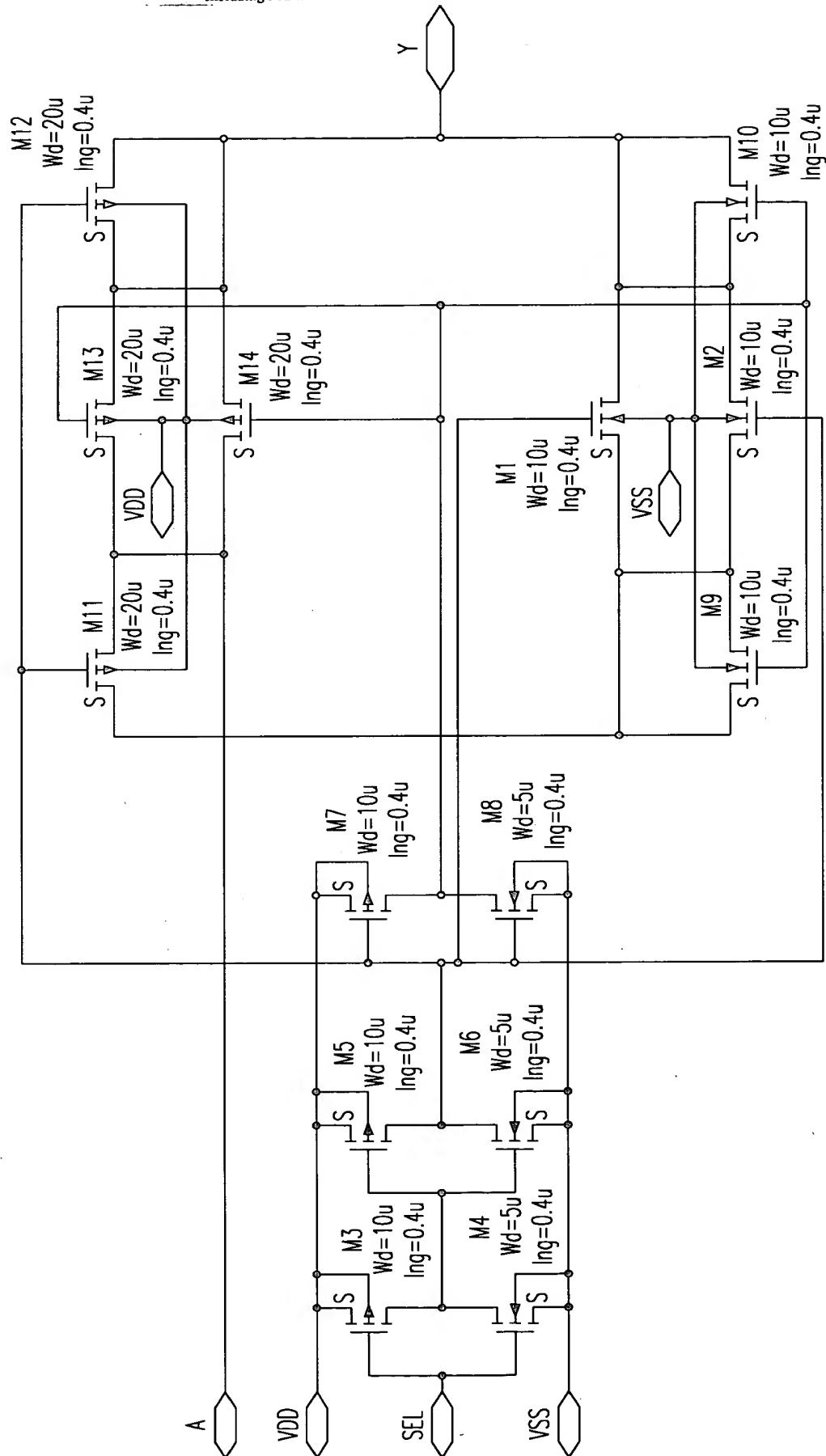


FIG. 132

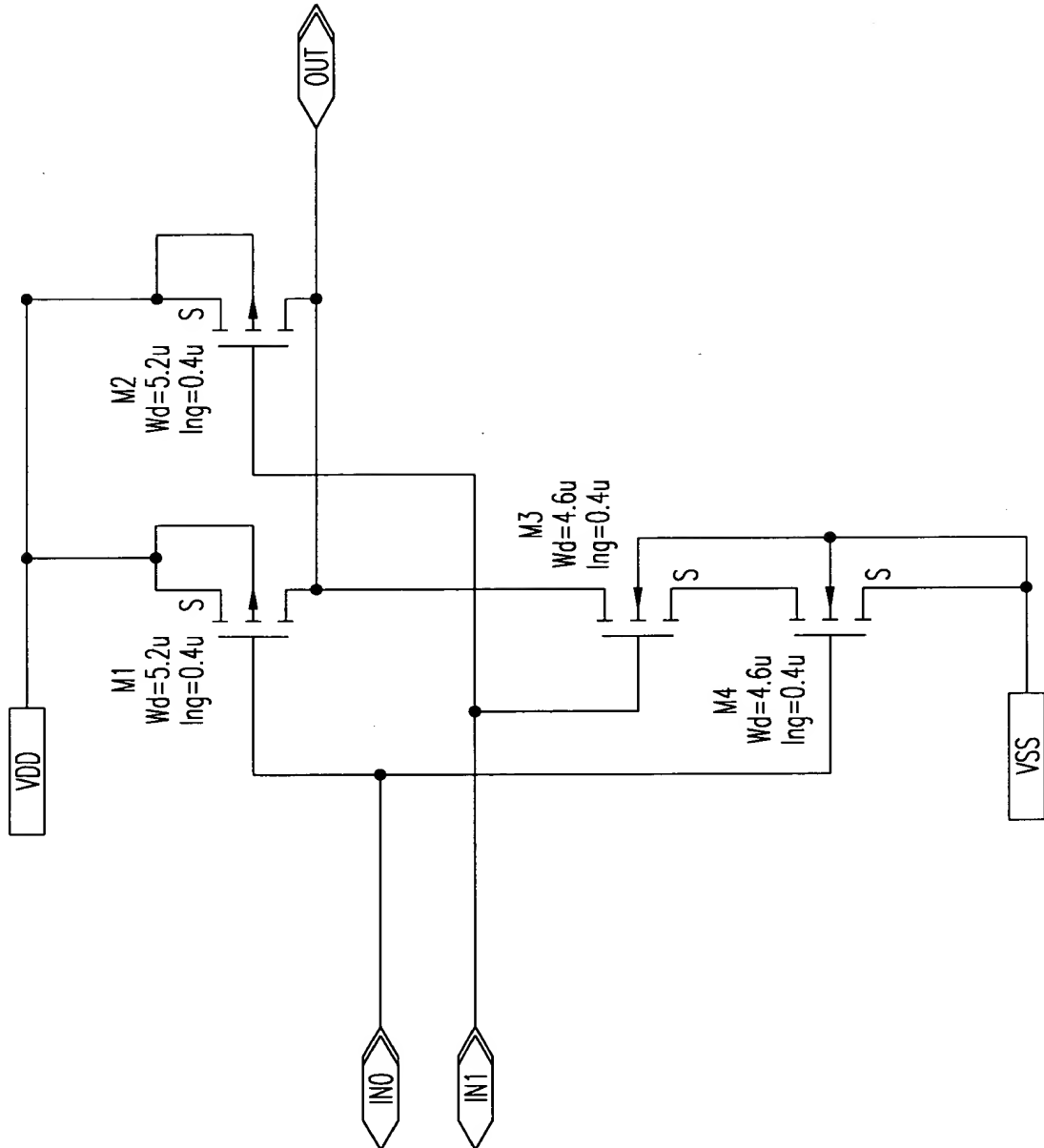


FIG. 133



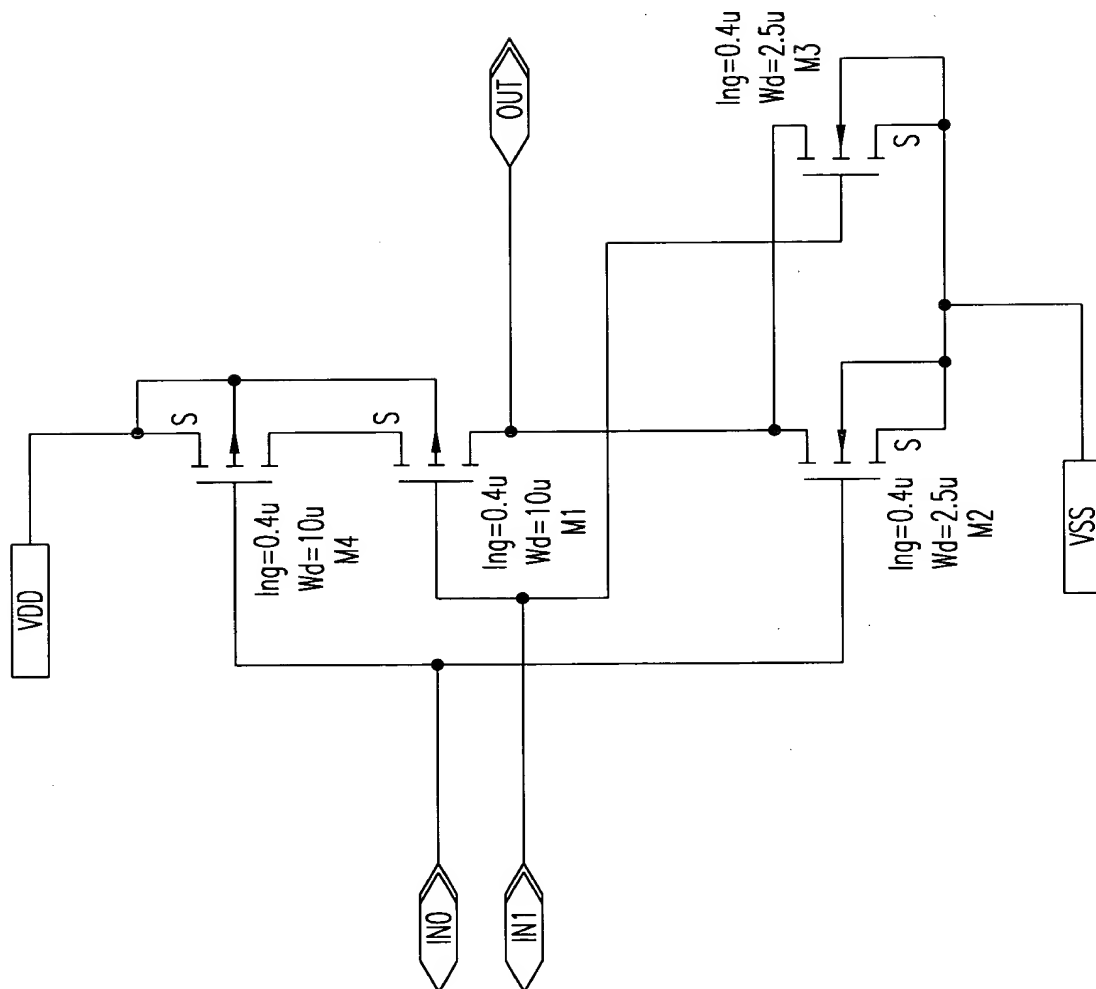


FIG. 134

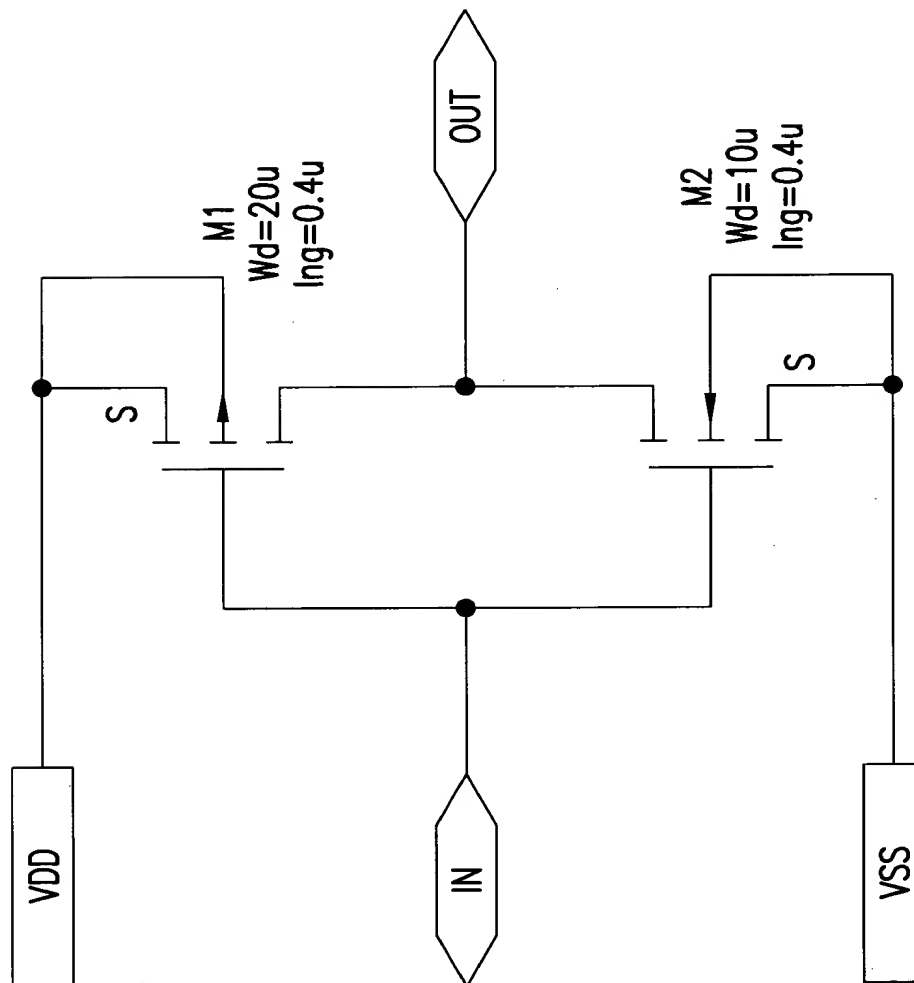


FIG.135

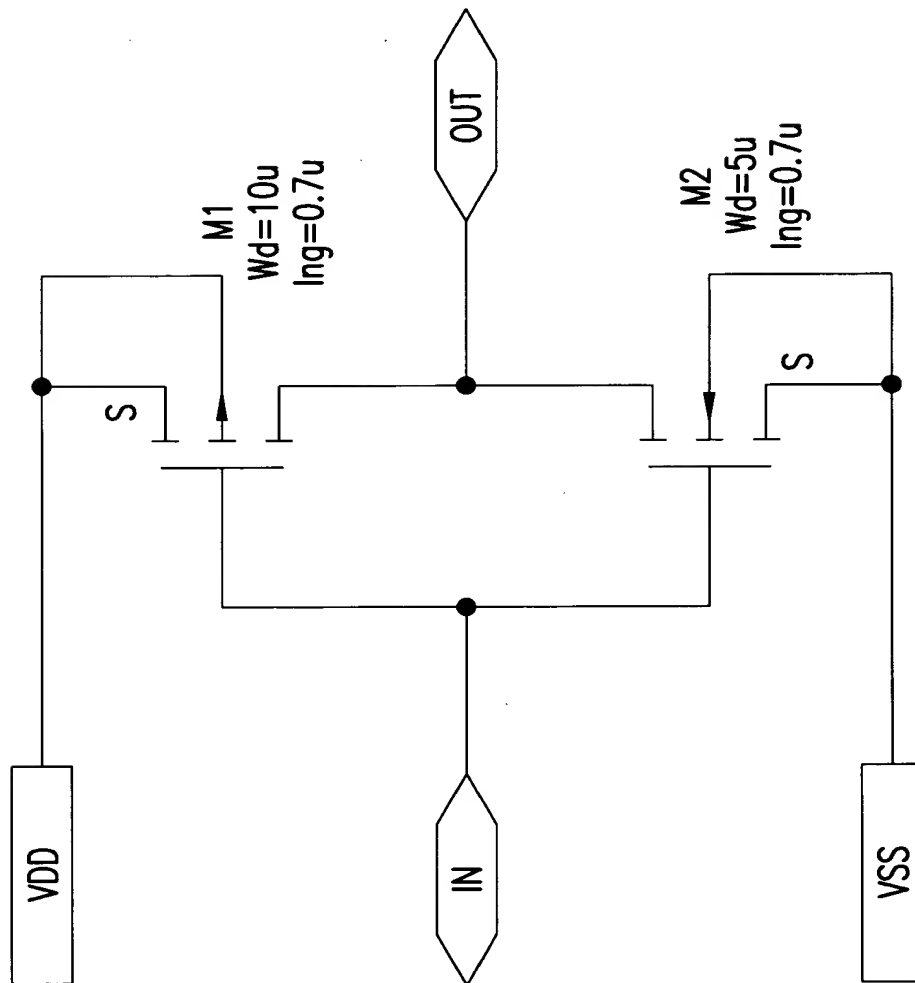


FIG.136

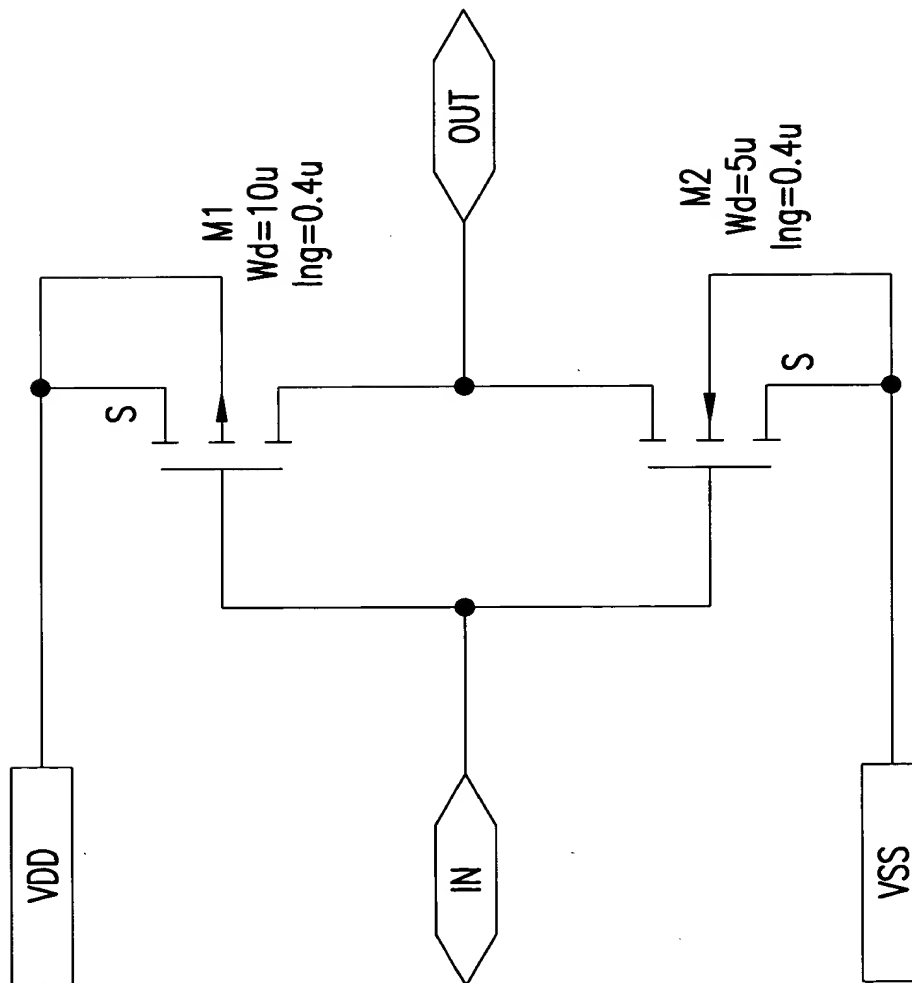


FIG.137

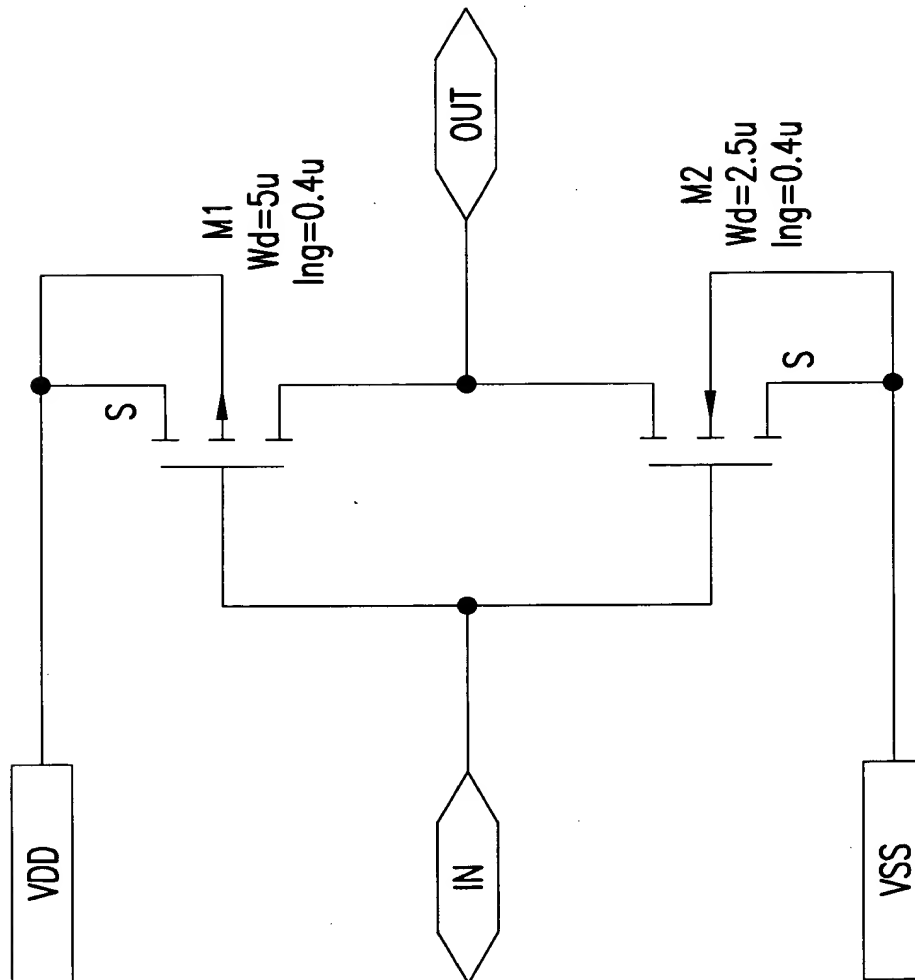


FIG.138

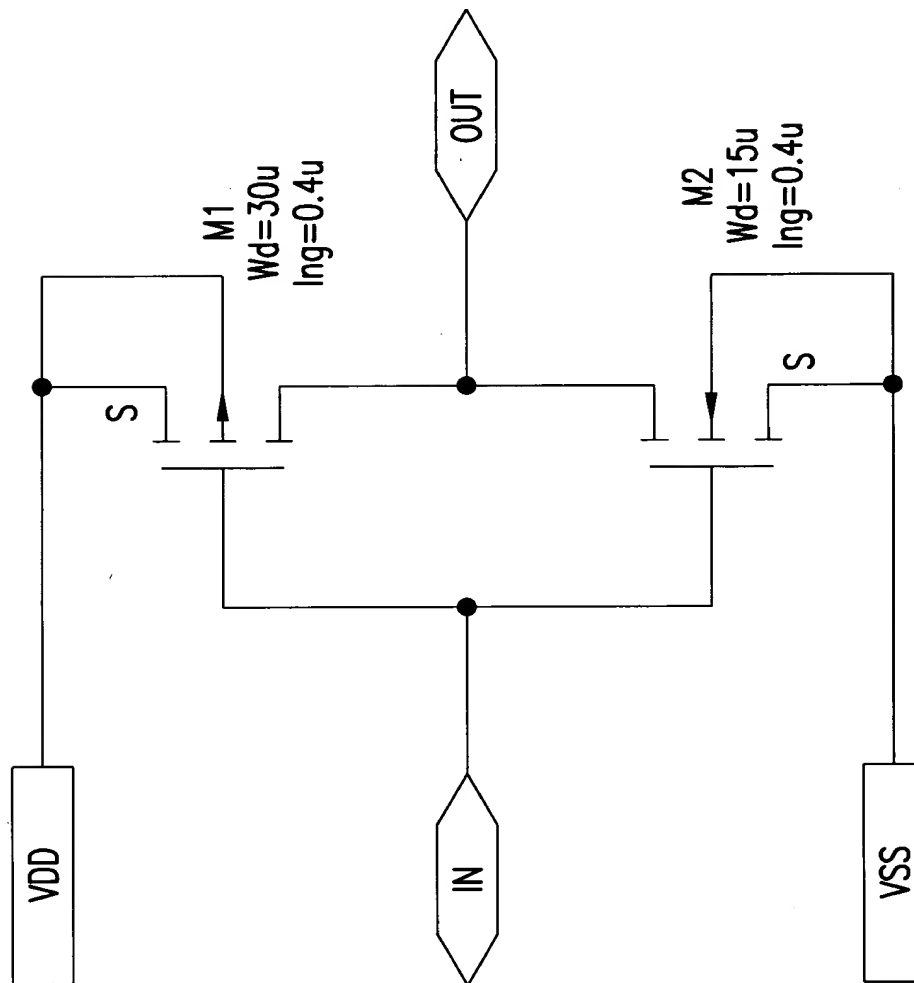


FIG.139



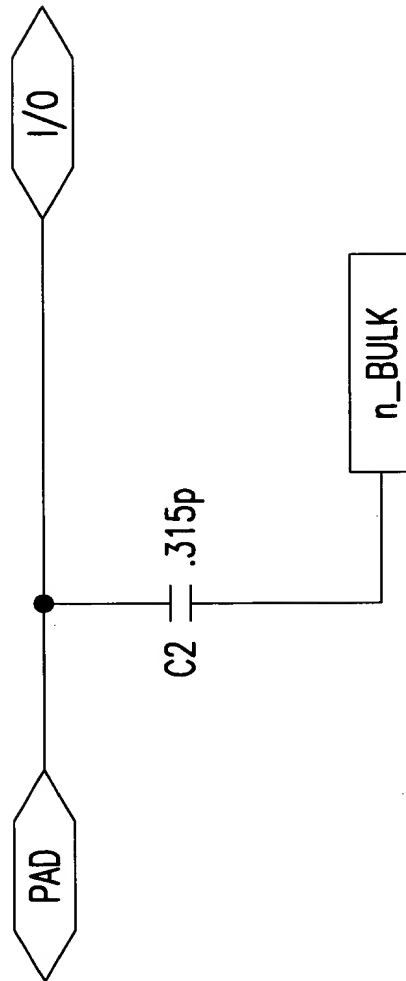


FIG. 141



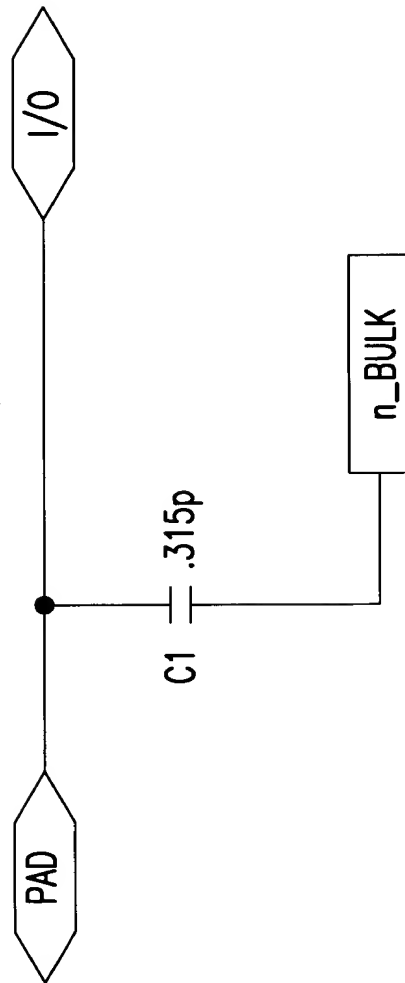


FIG.142

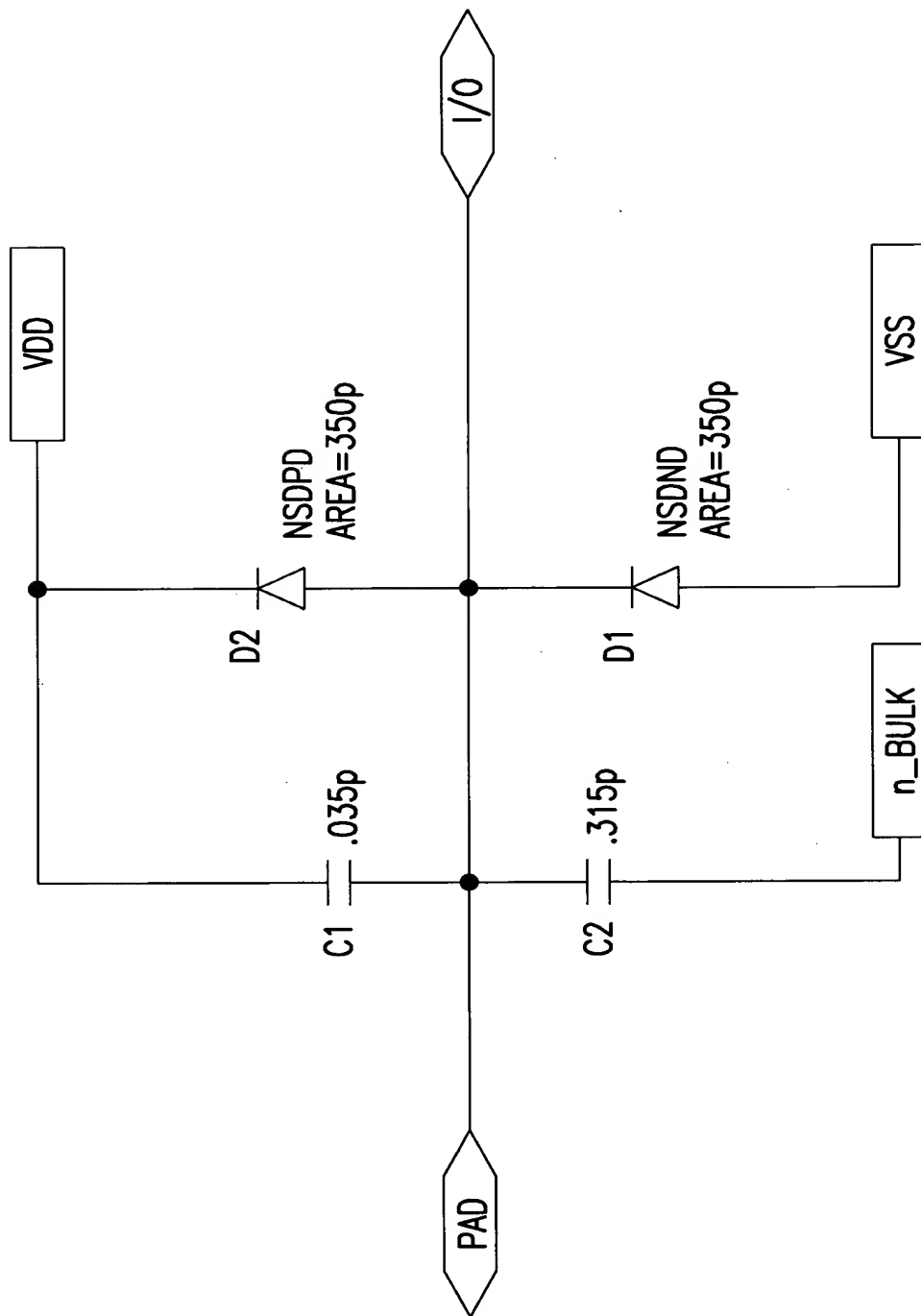


FIG.143

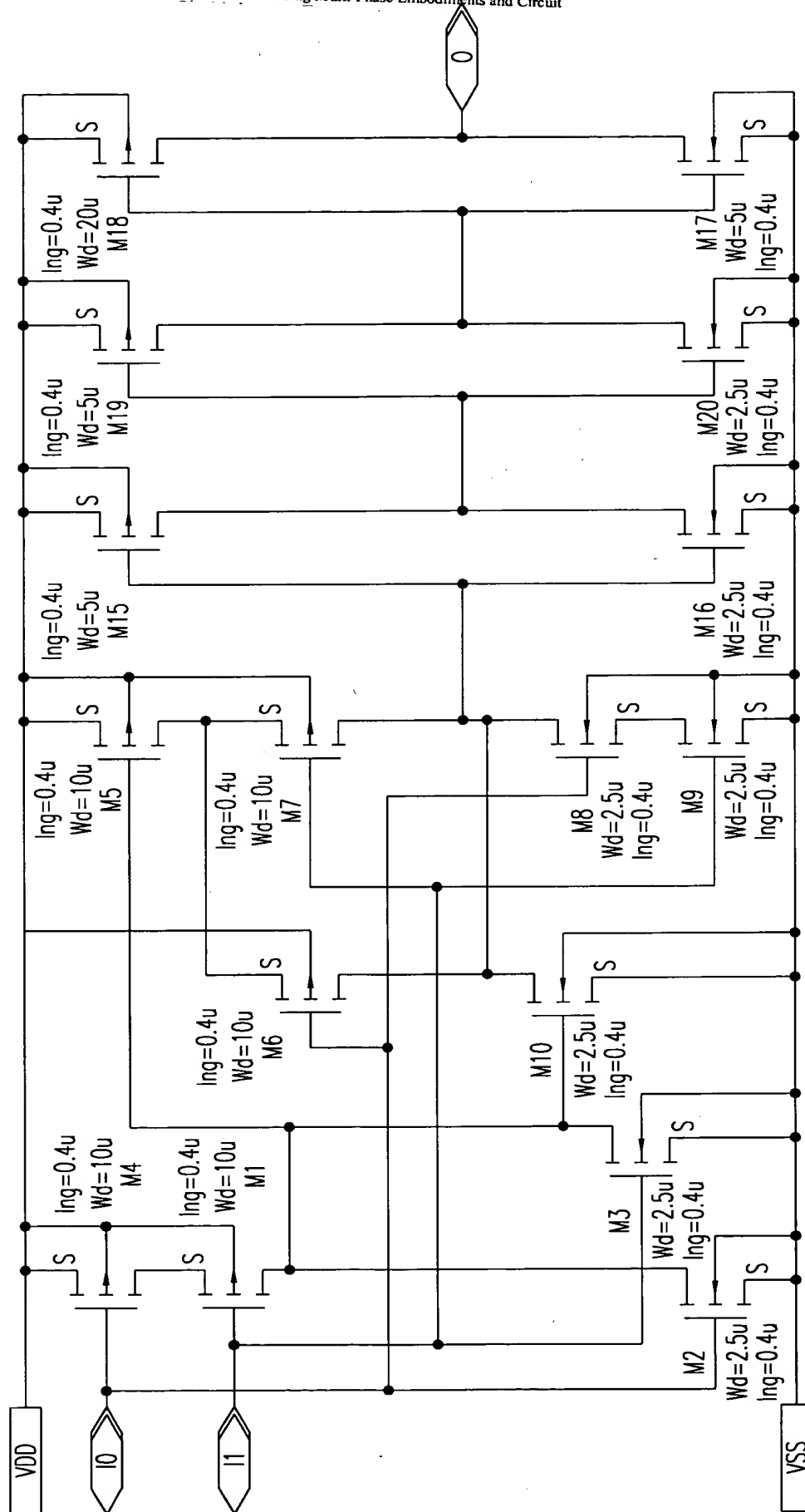


FIG. 144

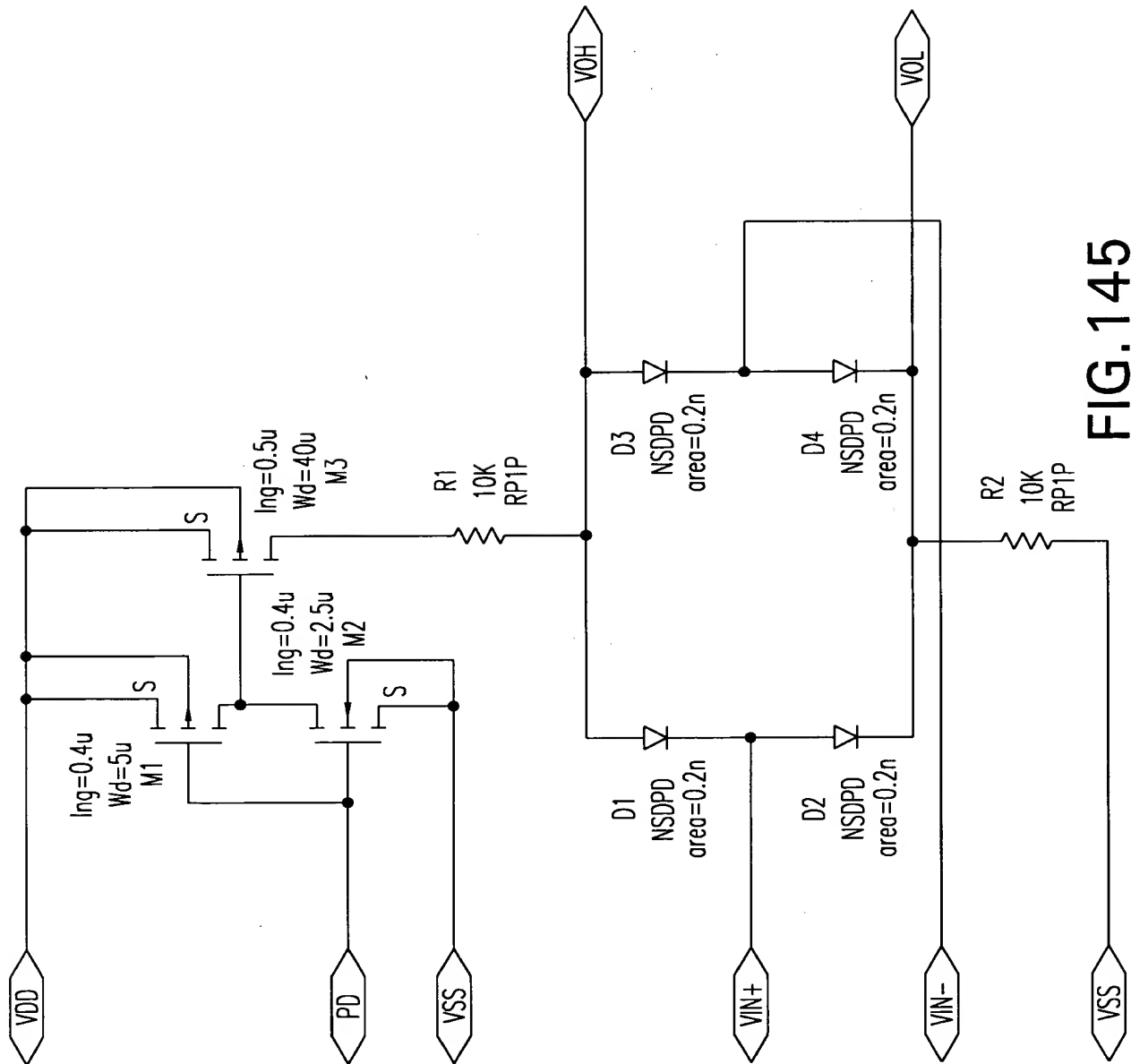


FIG. 145

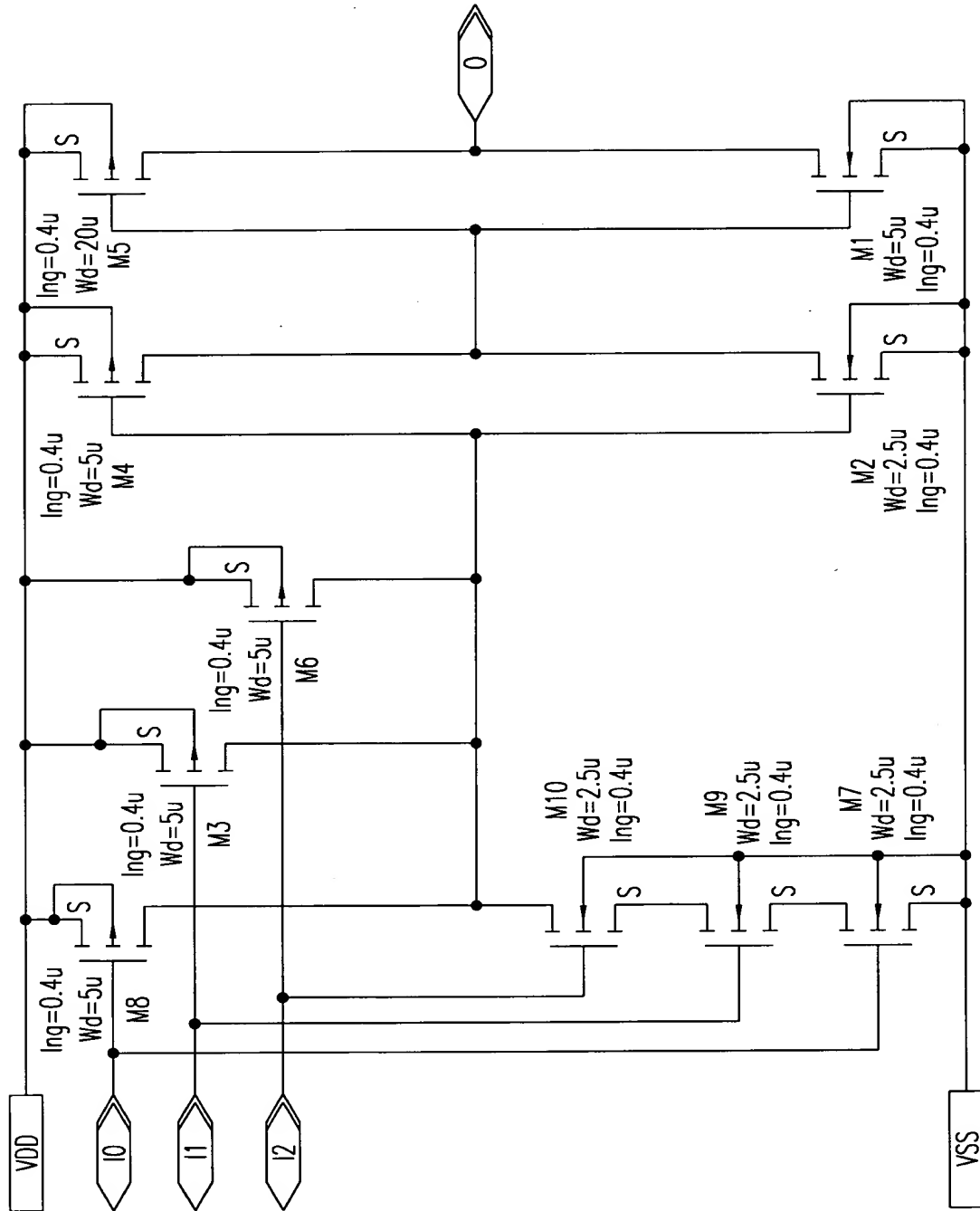


FIG. 146

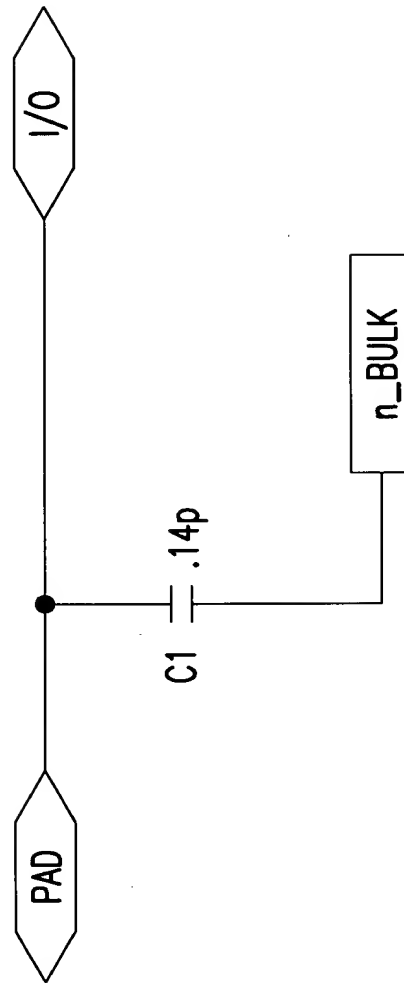


FIG.147

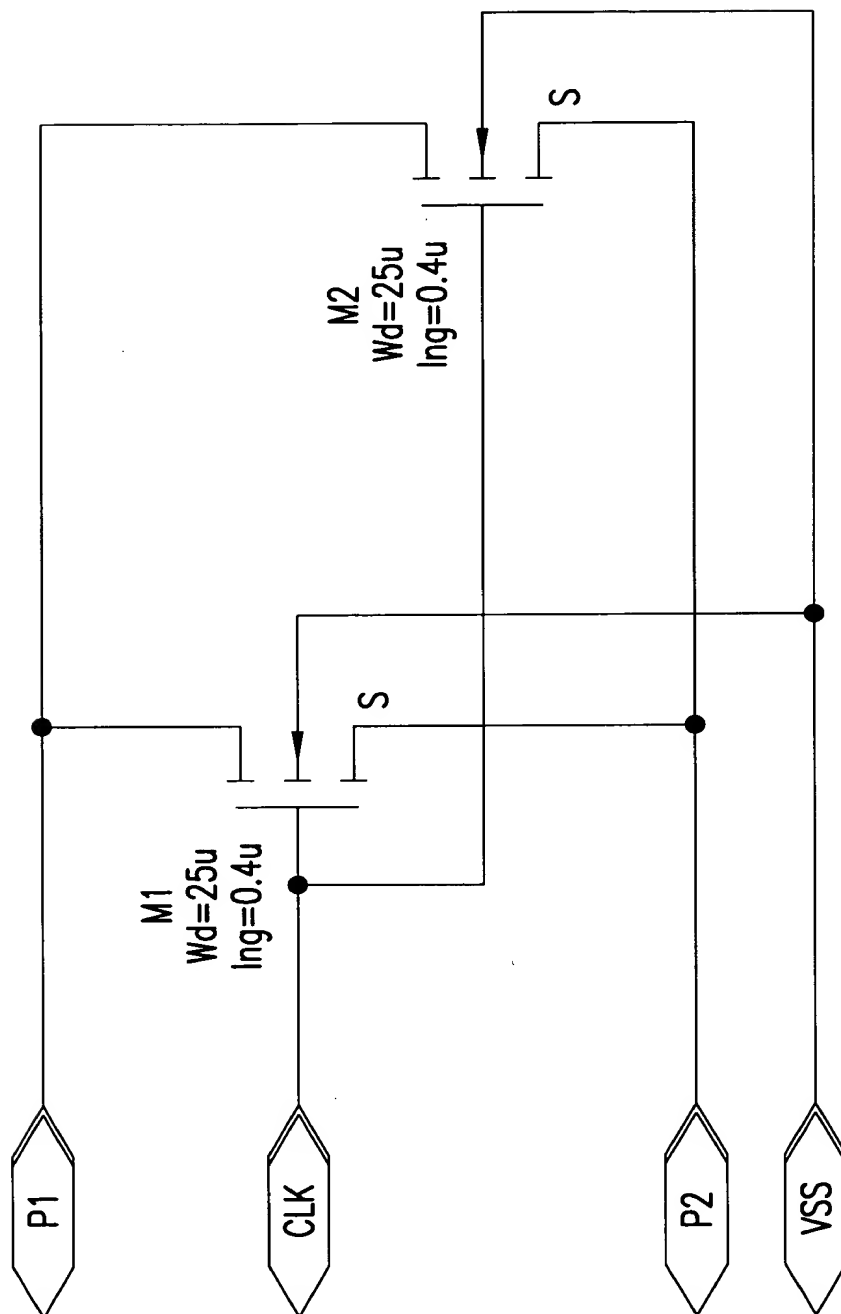


FIG.148

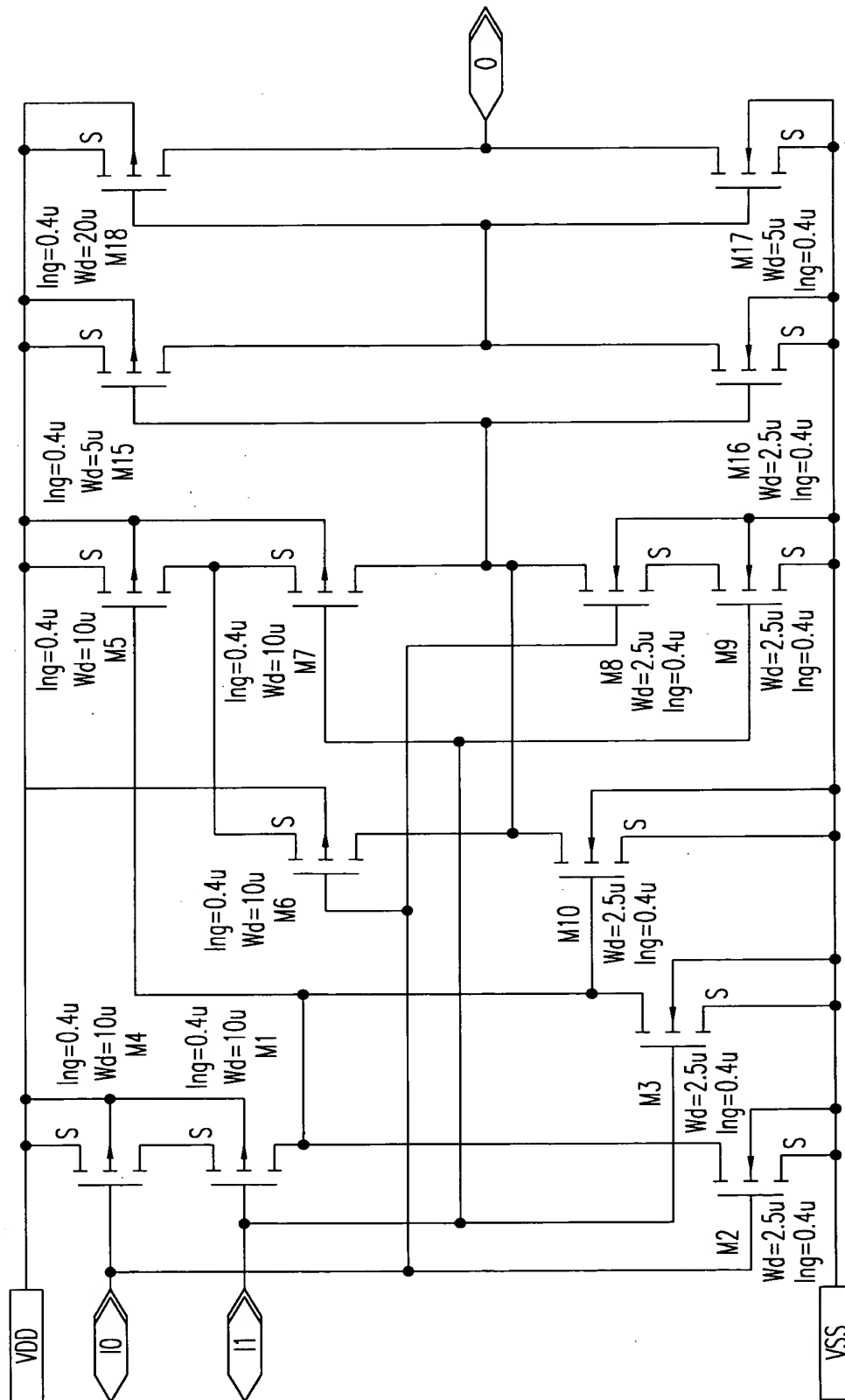


FIG. 149



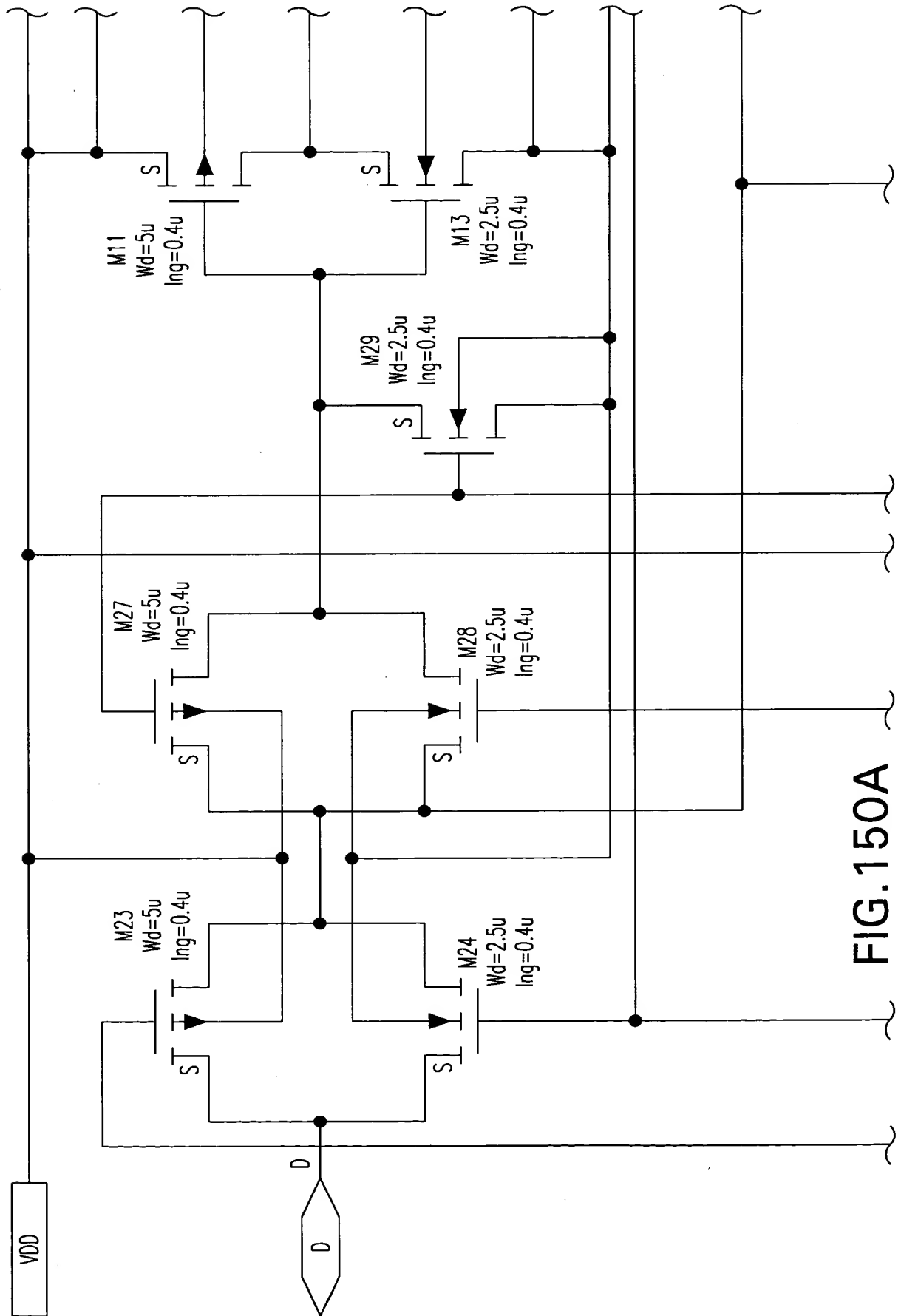
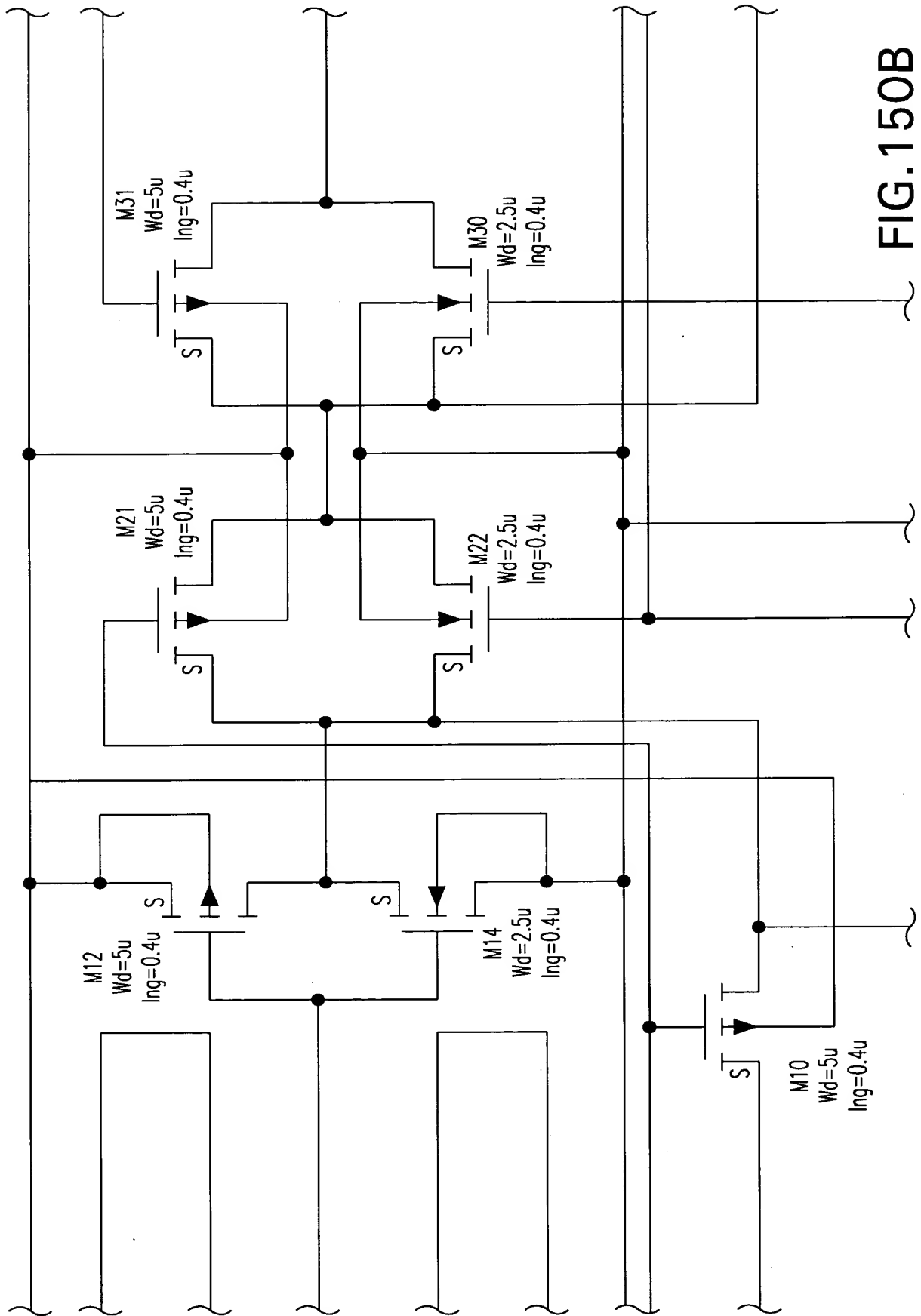


FIG. 150A



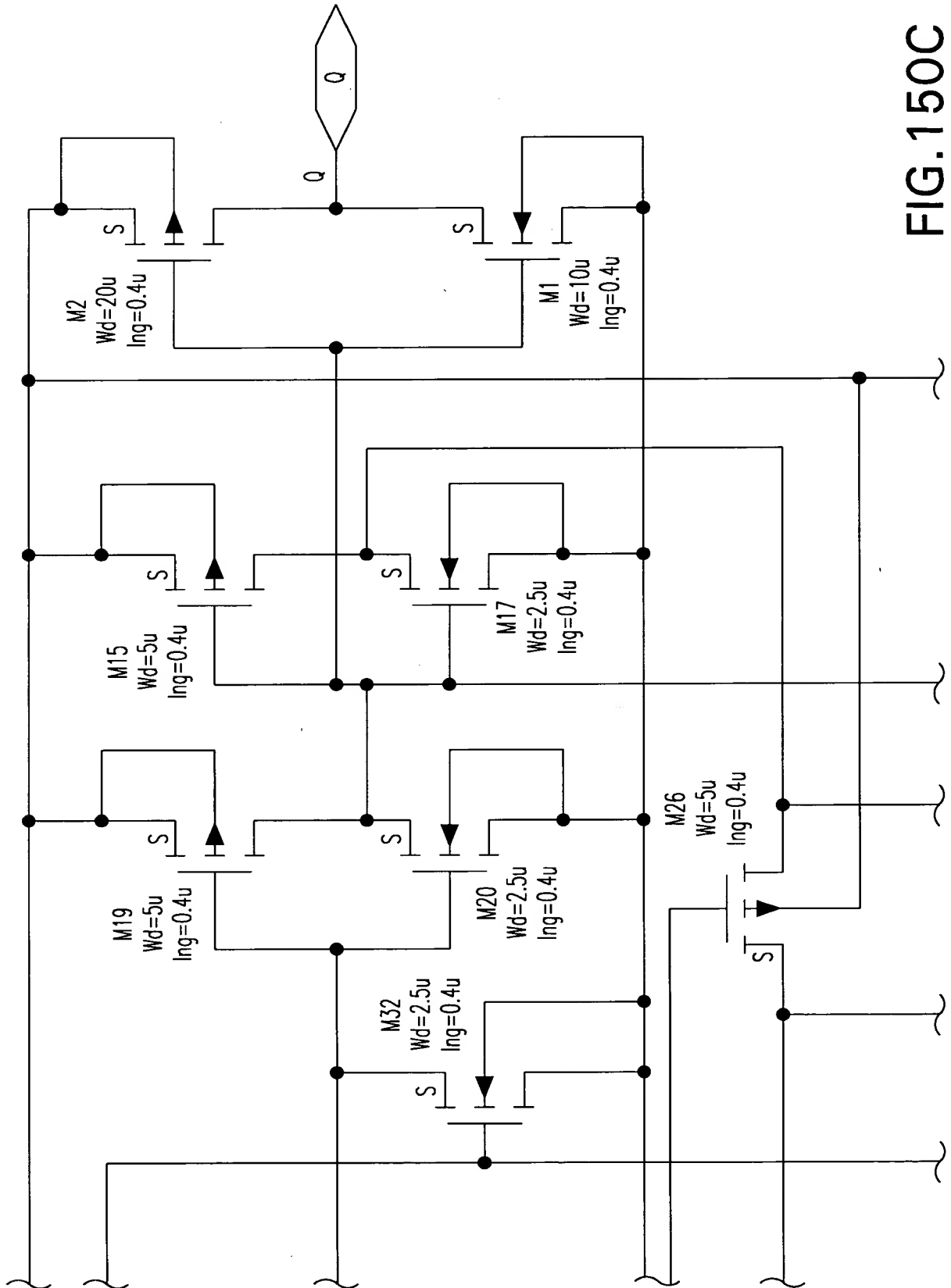


FIG. 150C

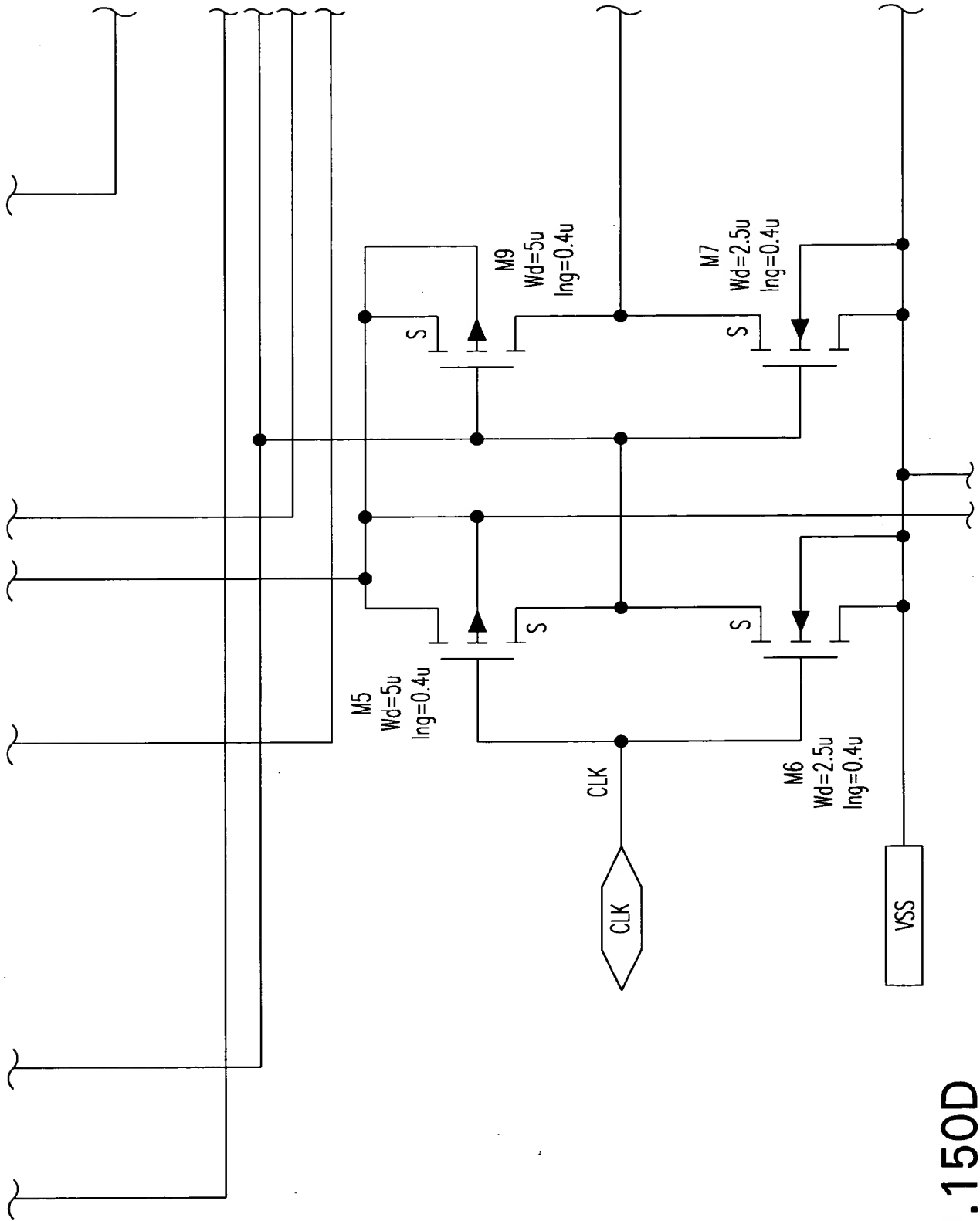
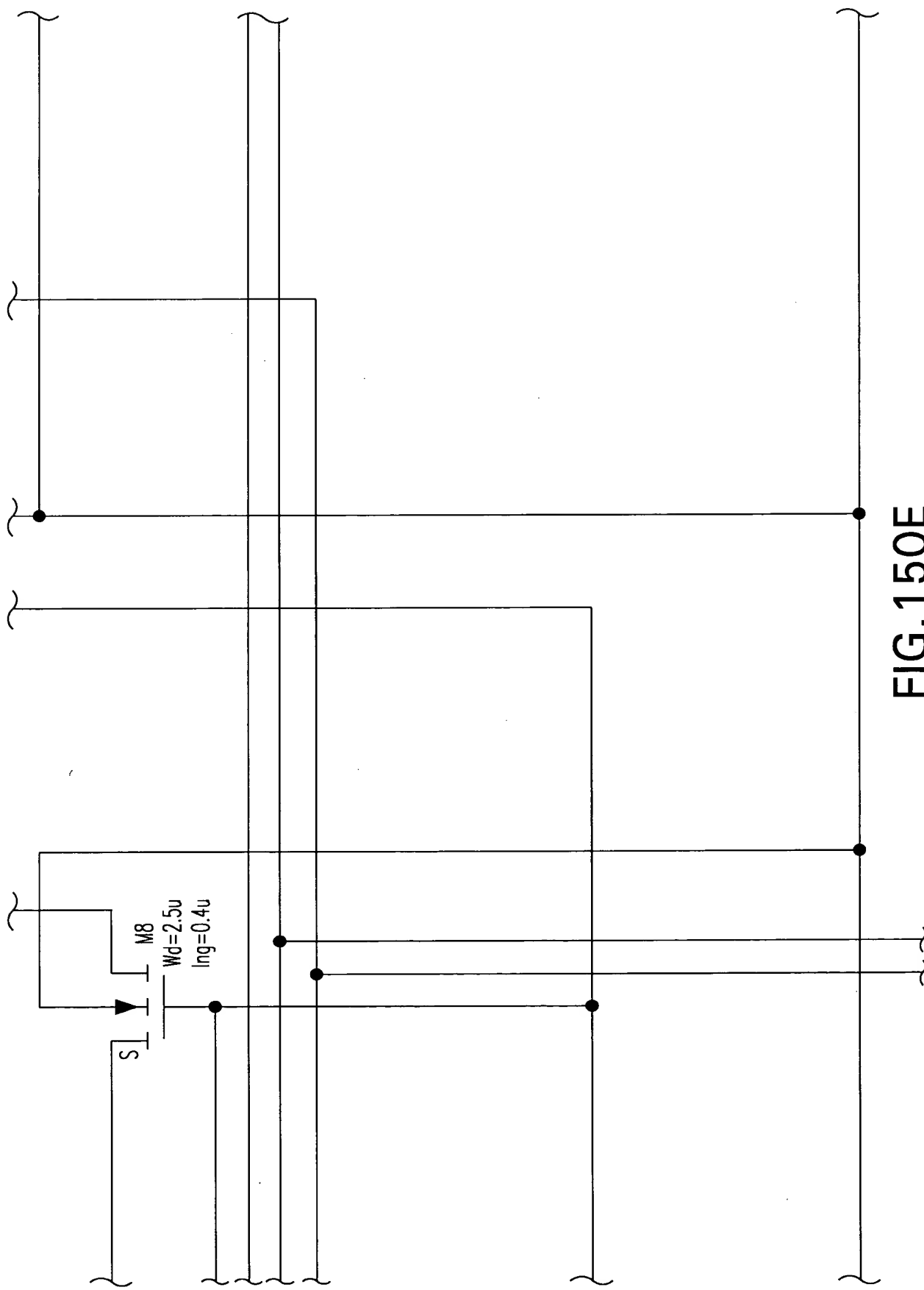


FIG. 150D



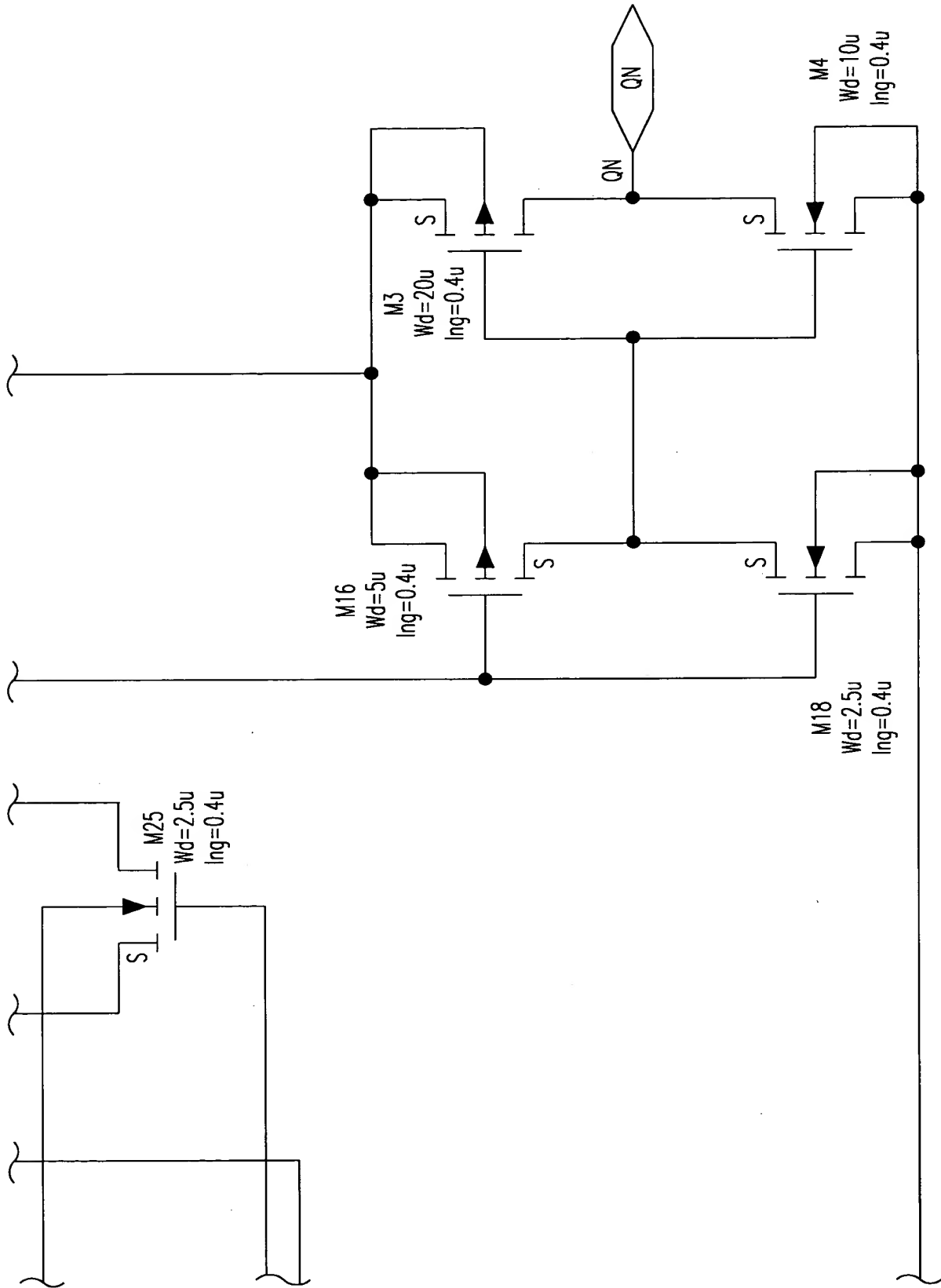
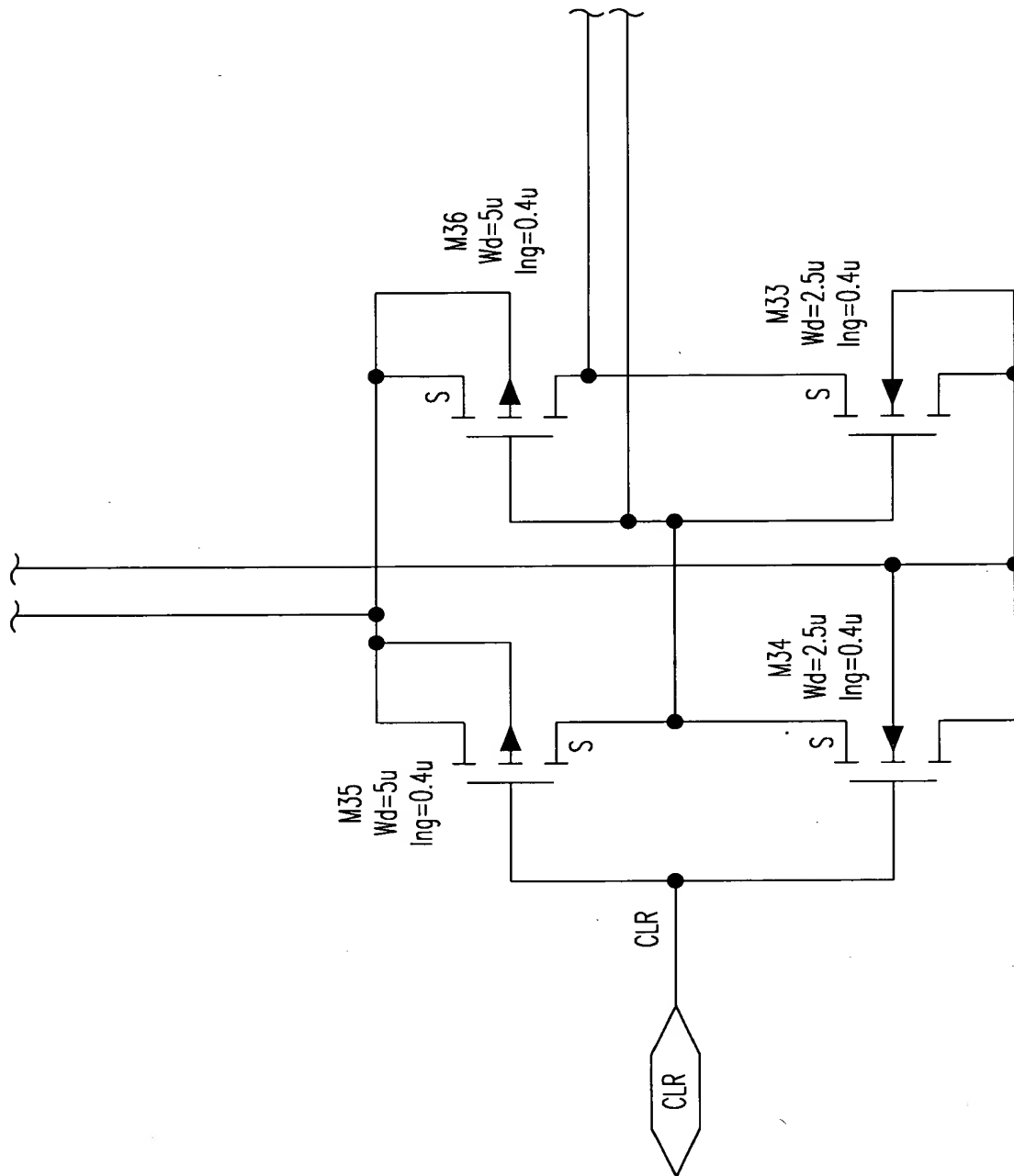
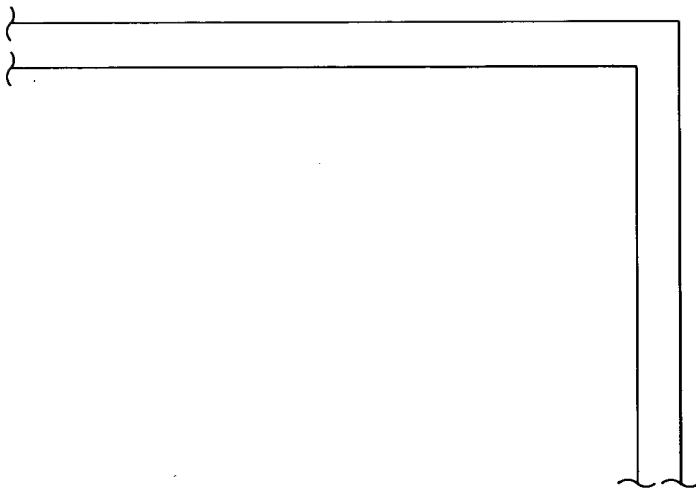


FIG. 150F



**FIG. 150G**

FIG. 150H





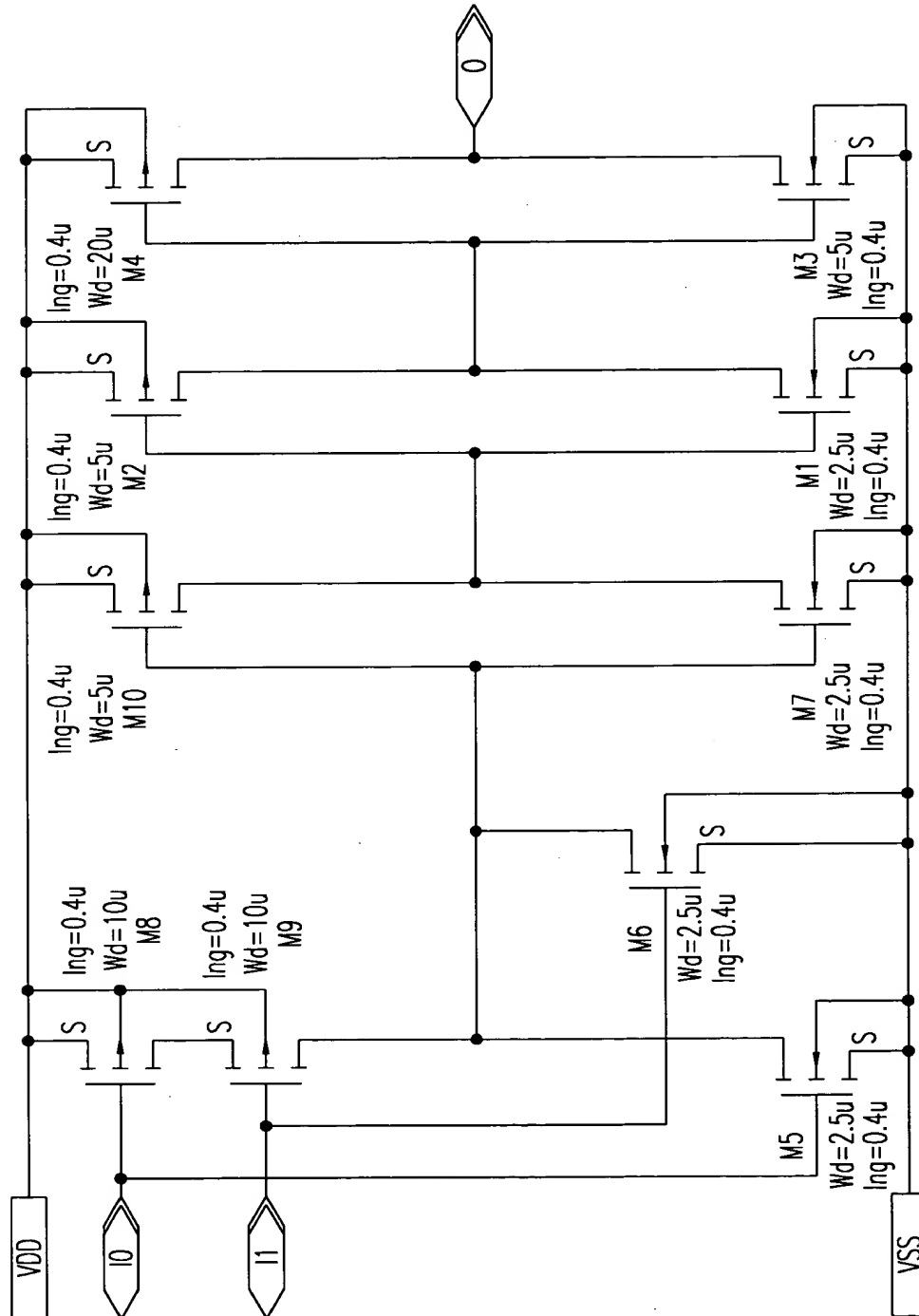
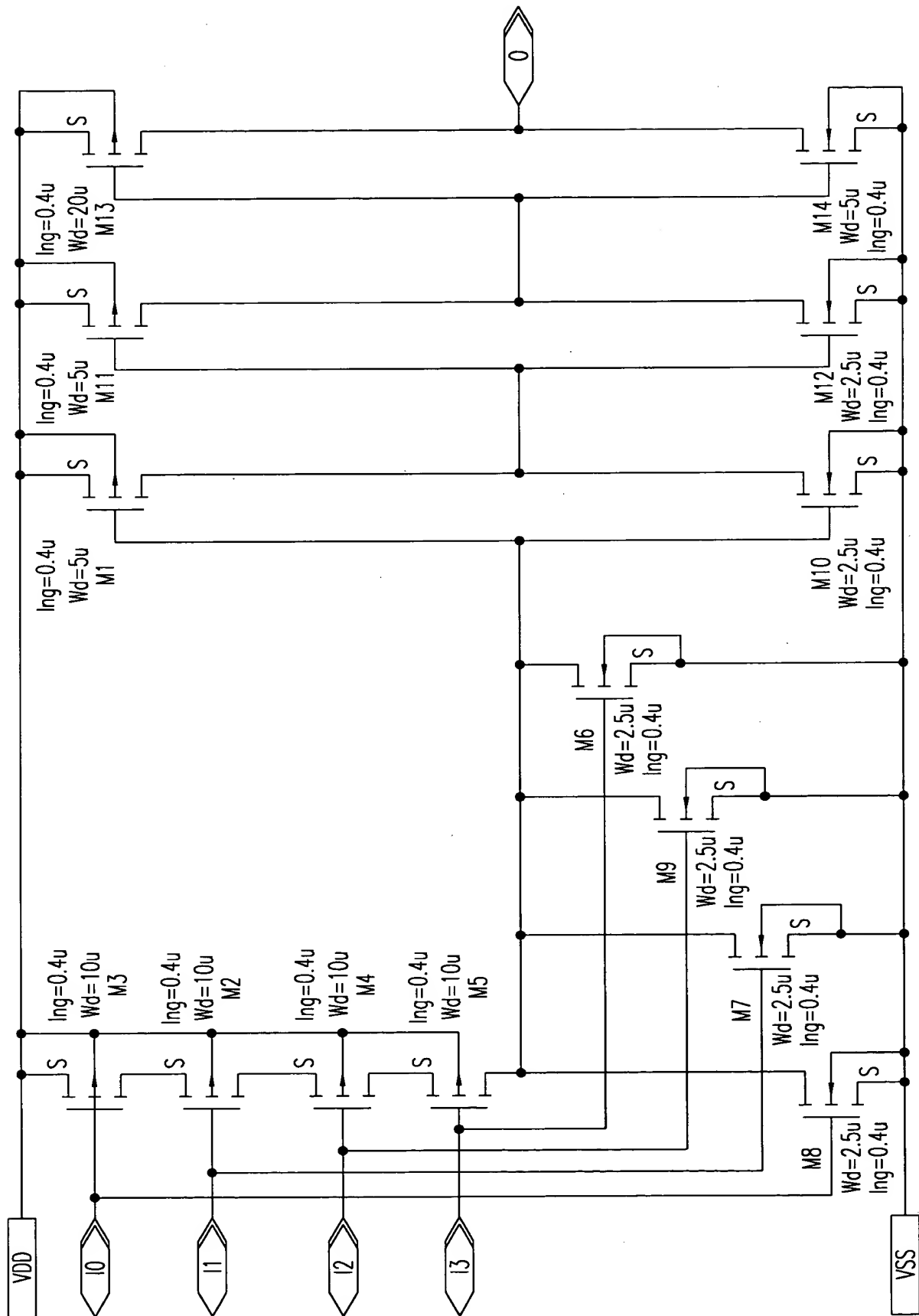


FIG. 151



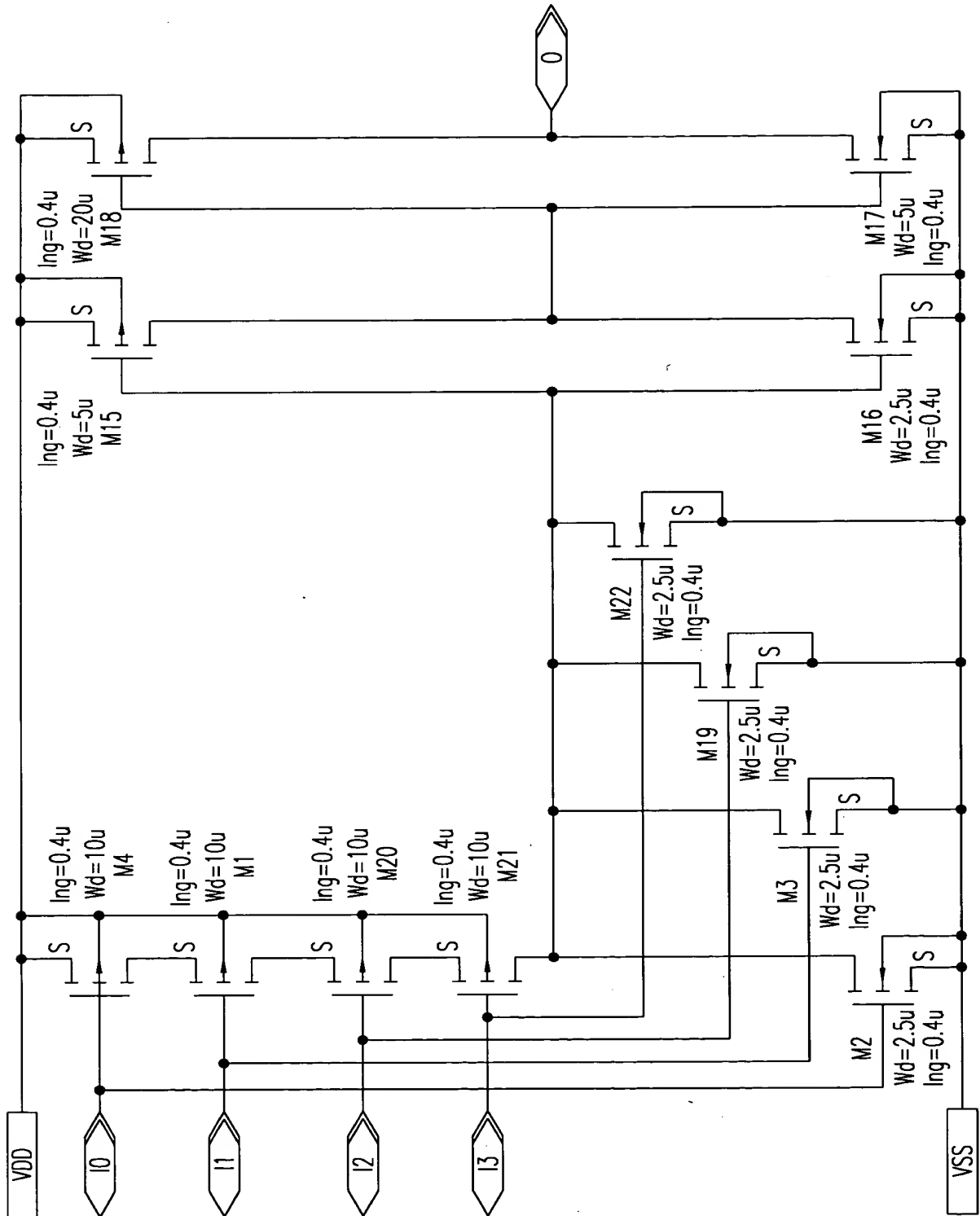


FIG. 153

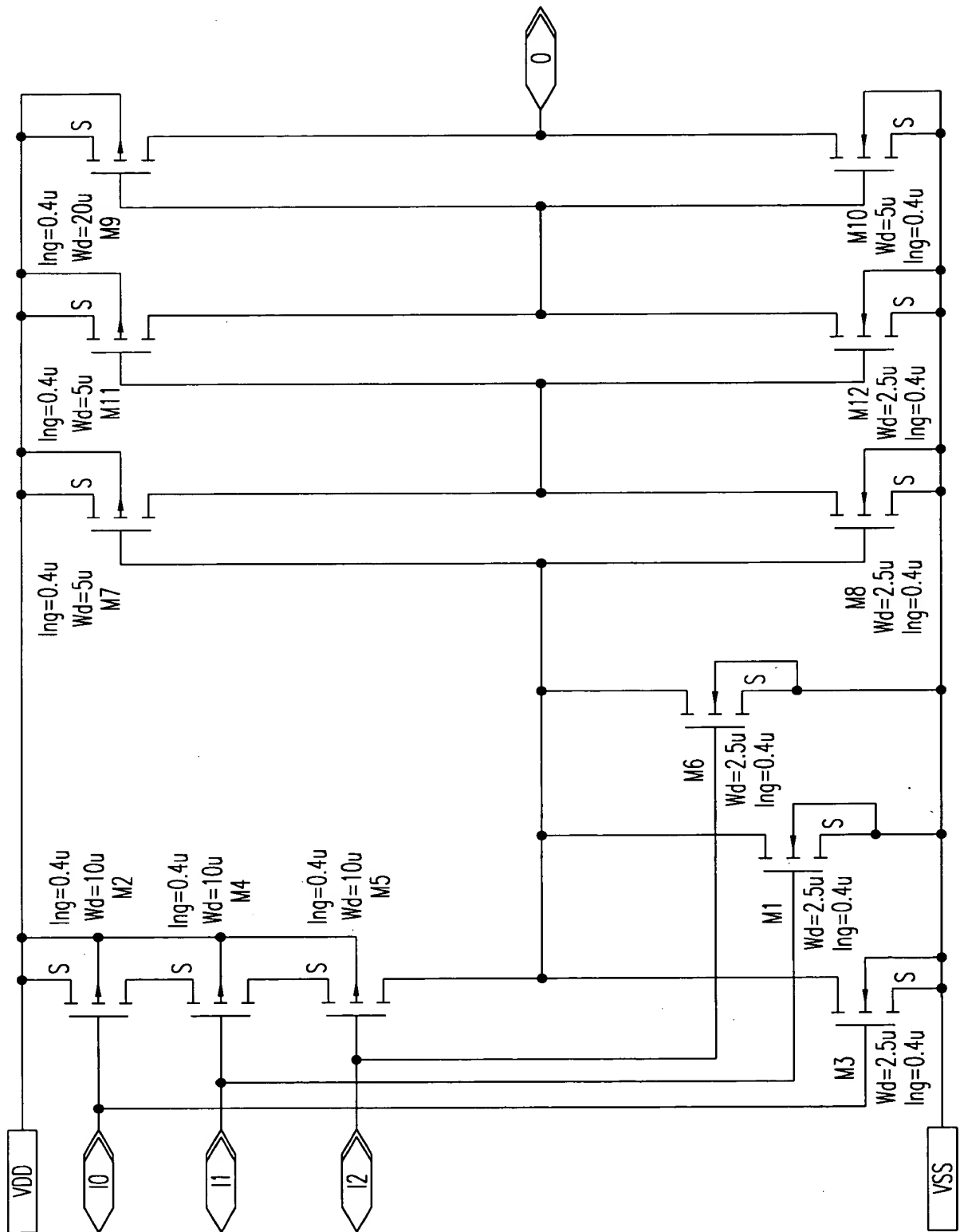


FIG. 154

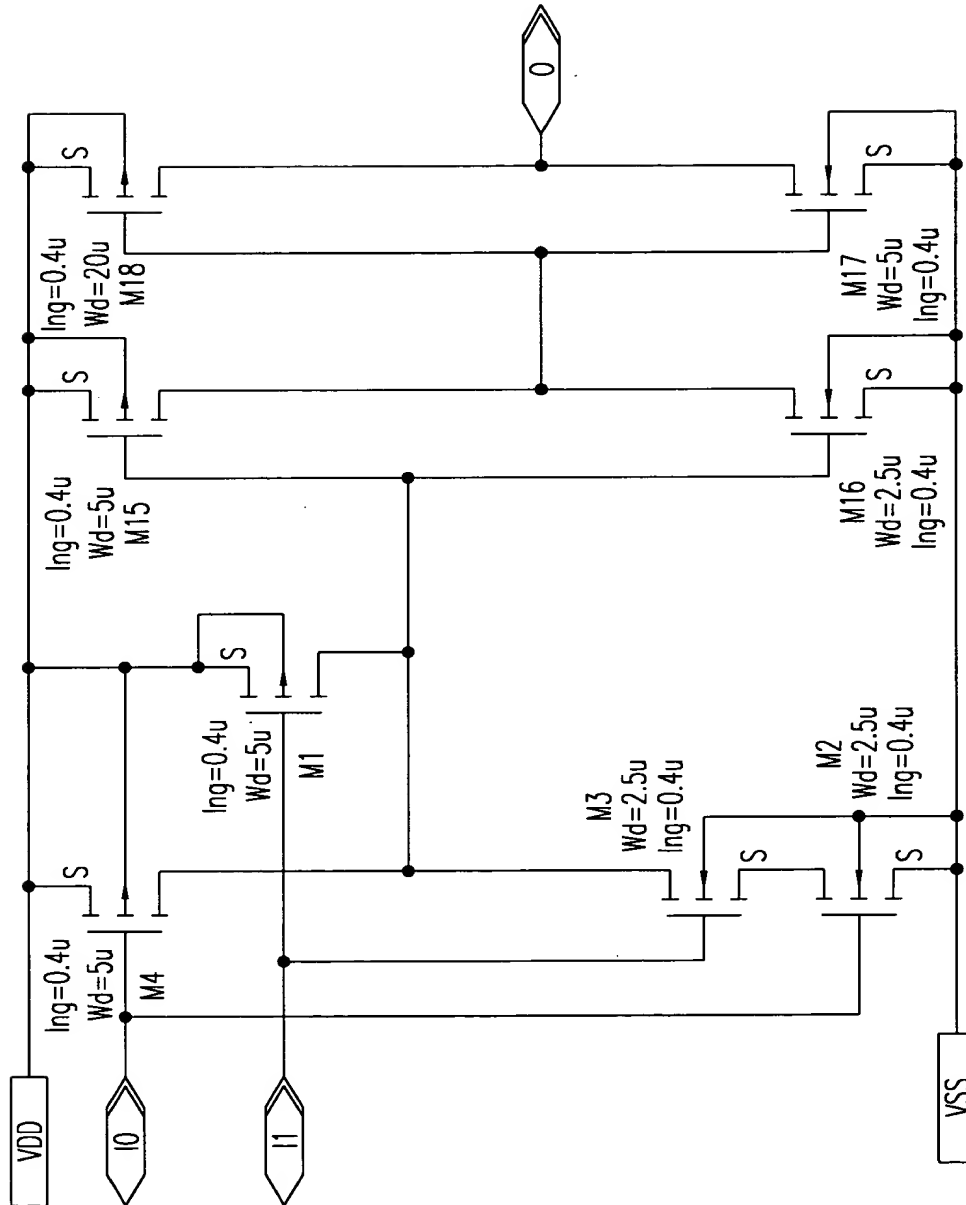


FIG. 155

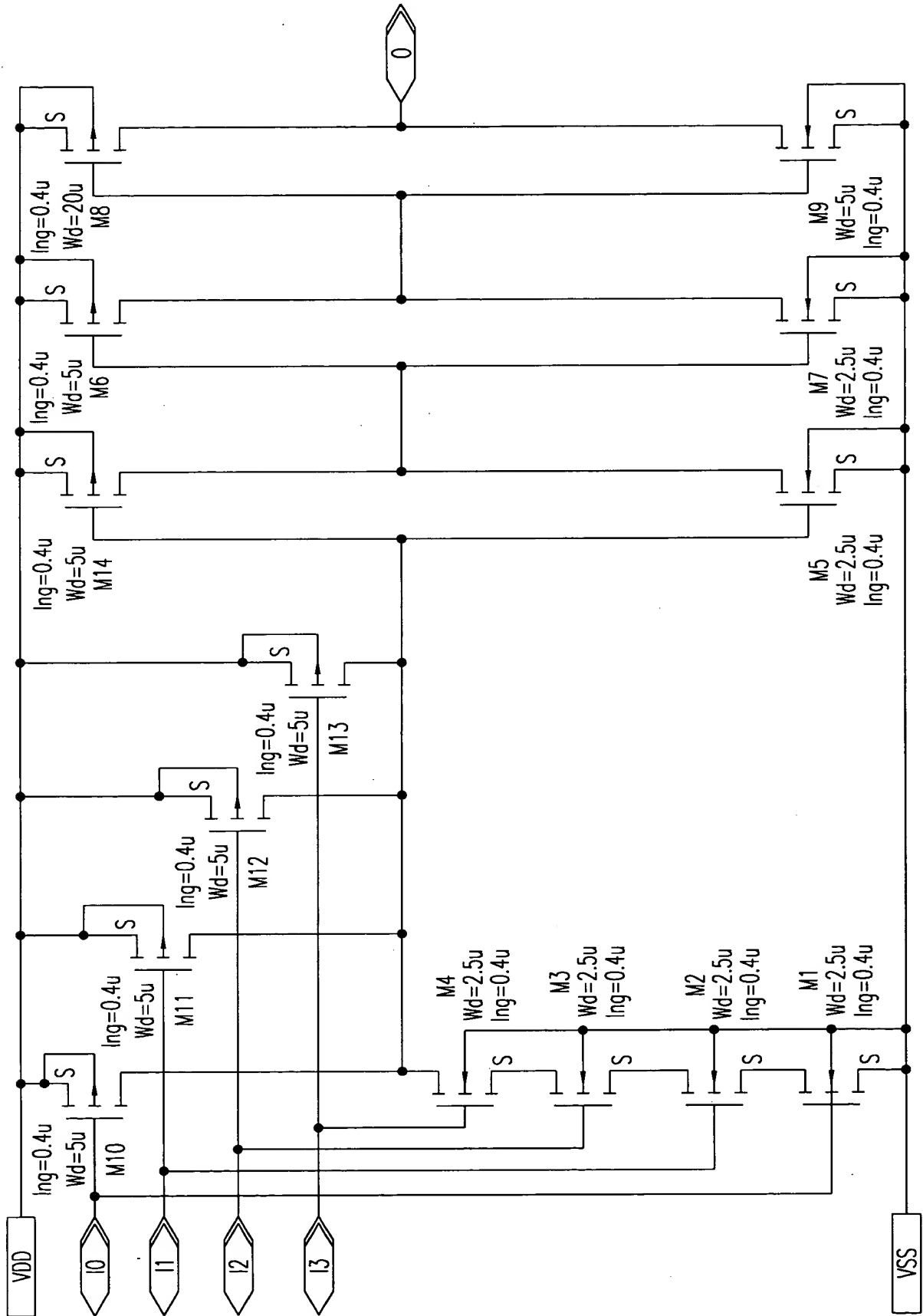


FIG. 156

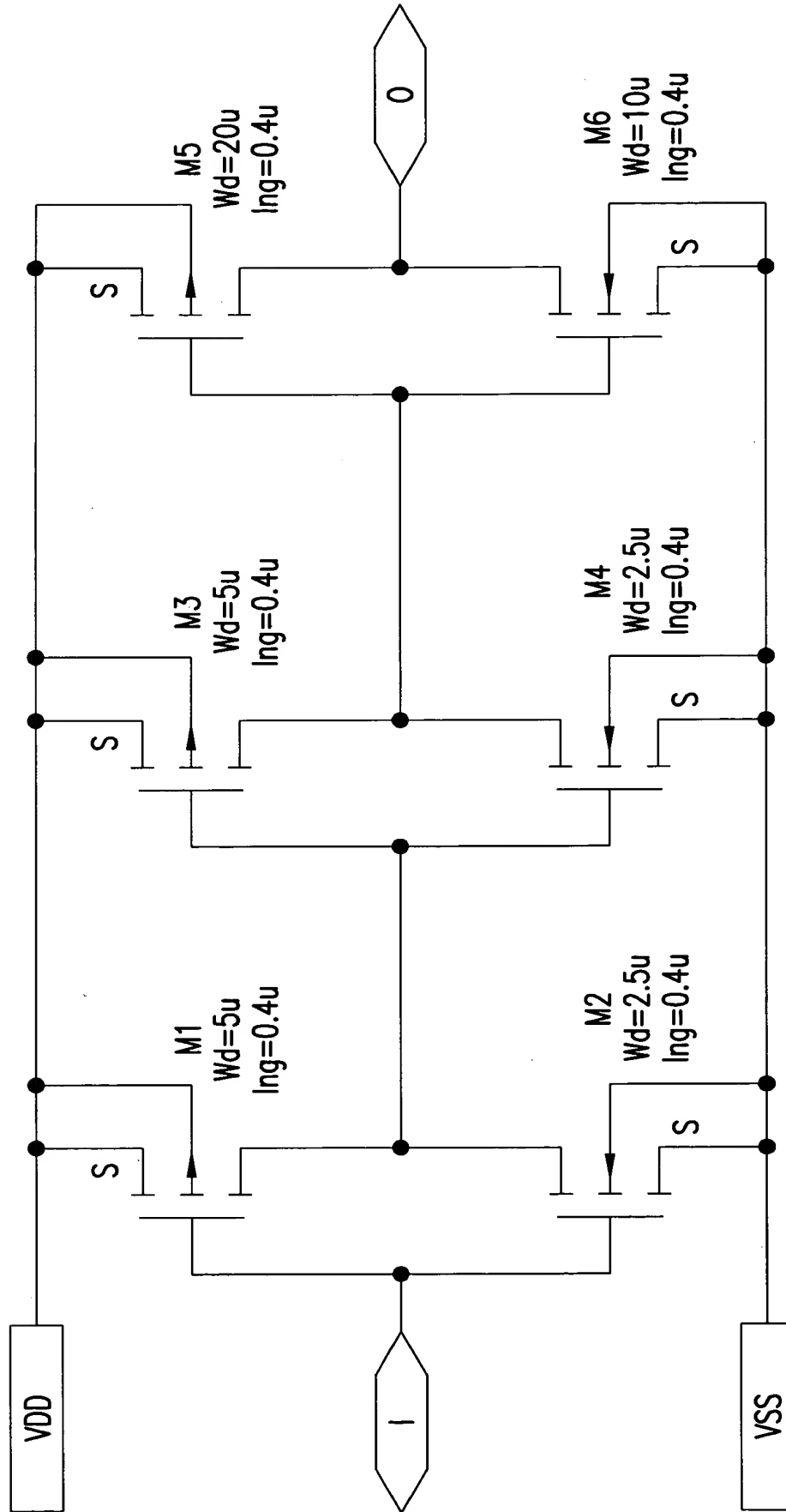


FIG.157

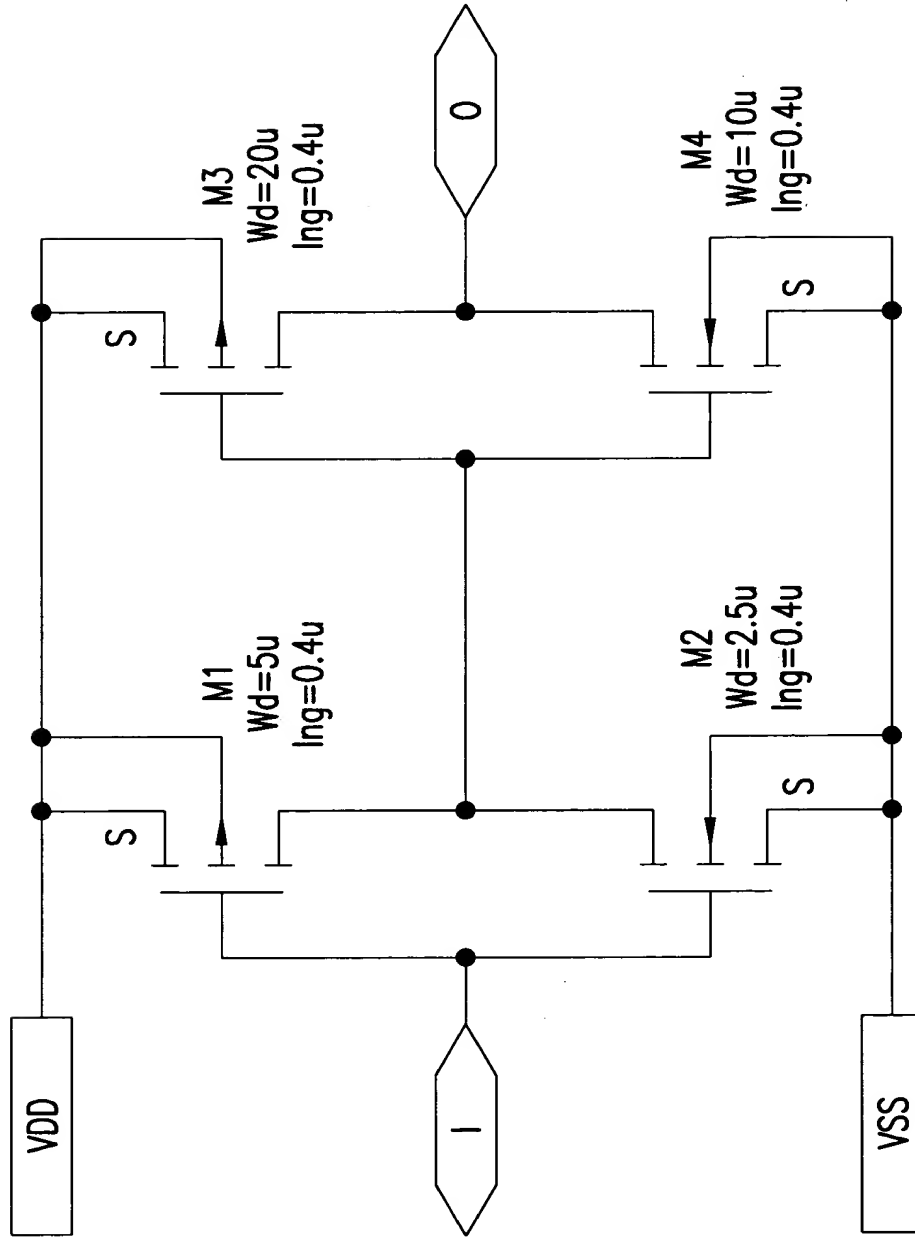


FIG. 158



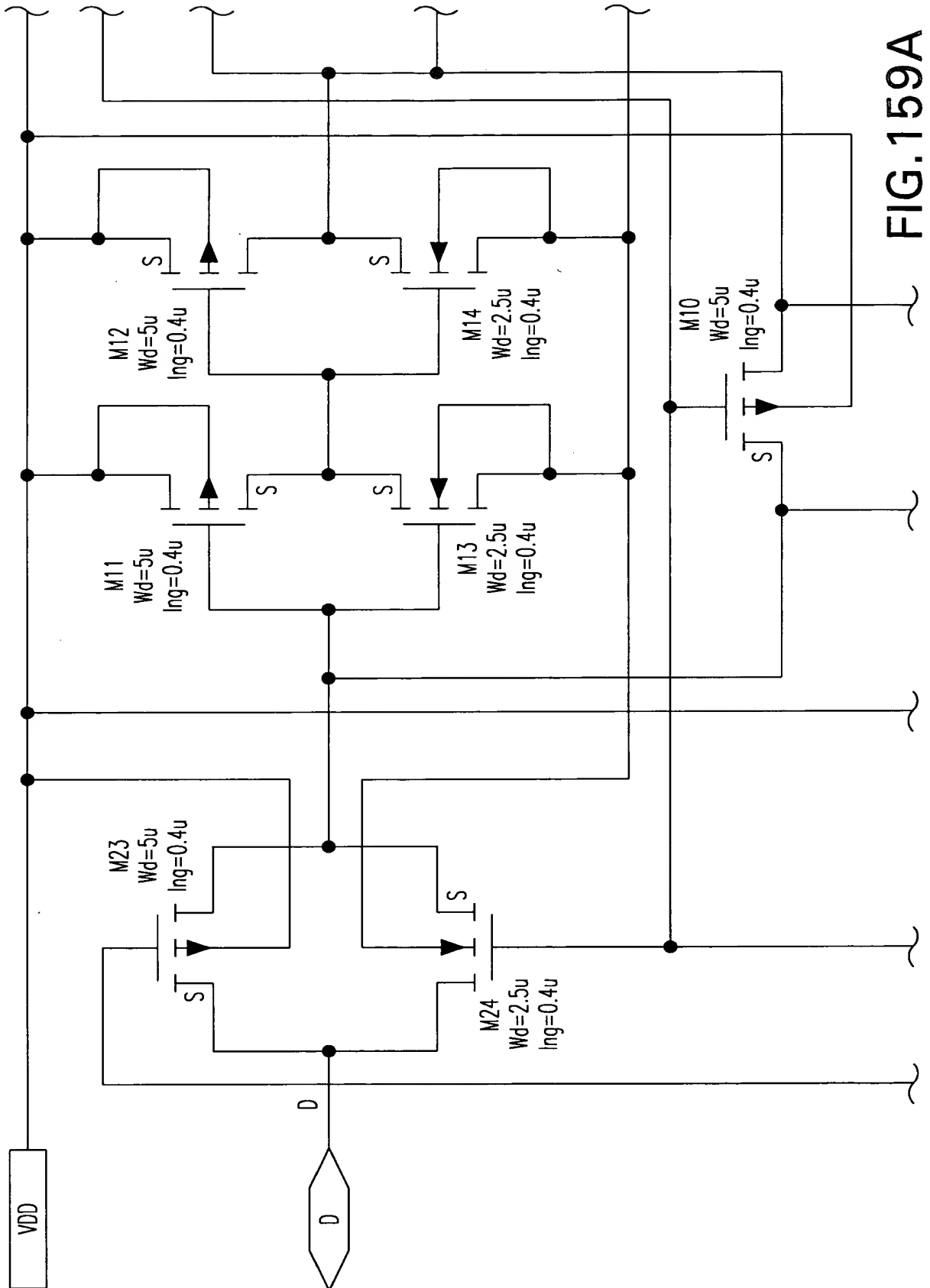


FIG. 159A

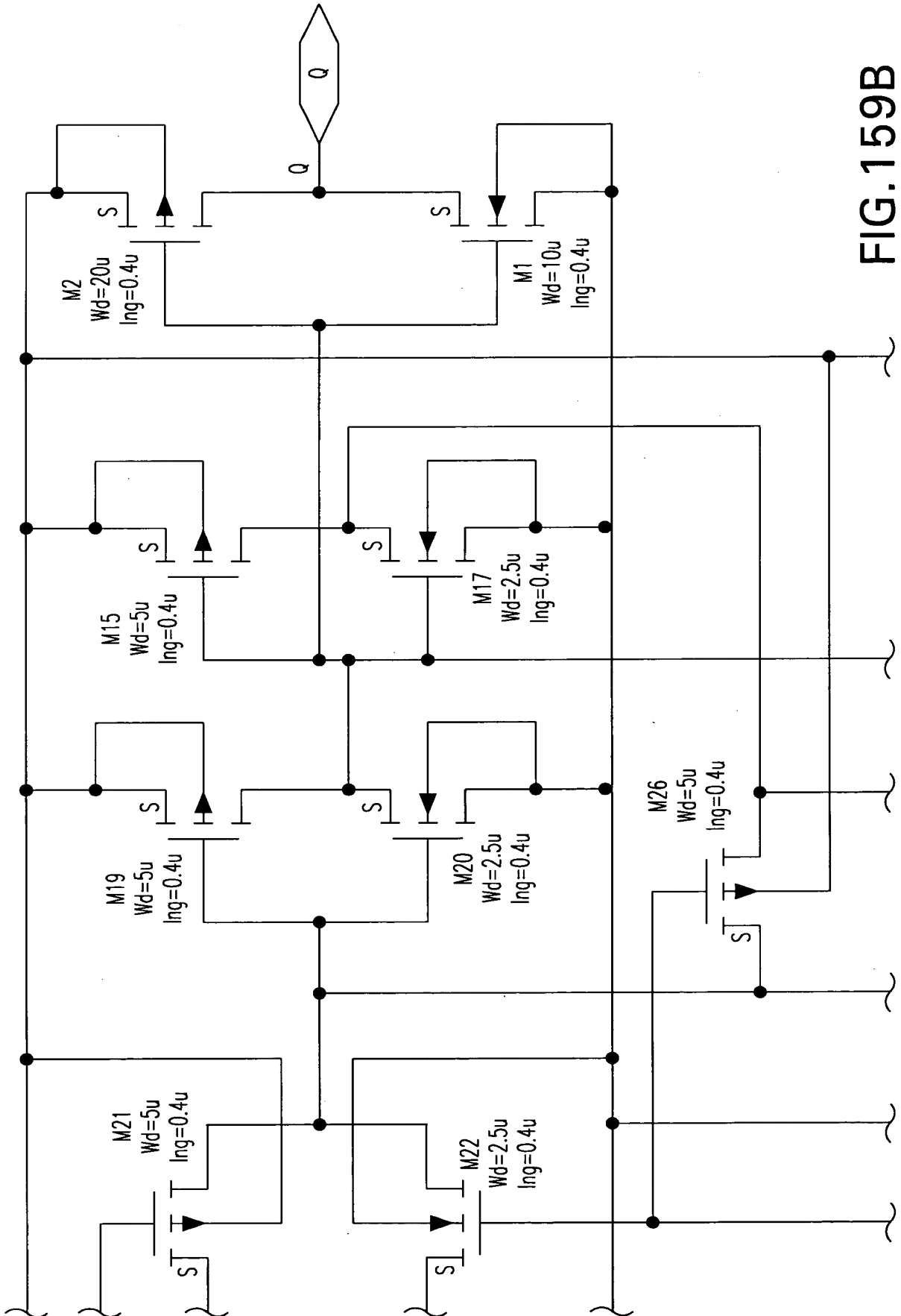


FIG. 159B

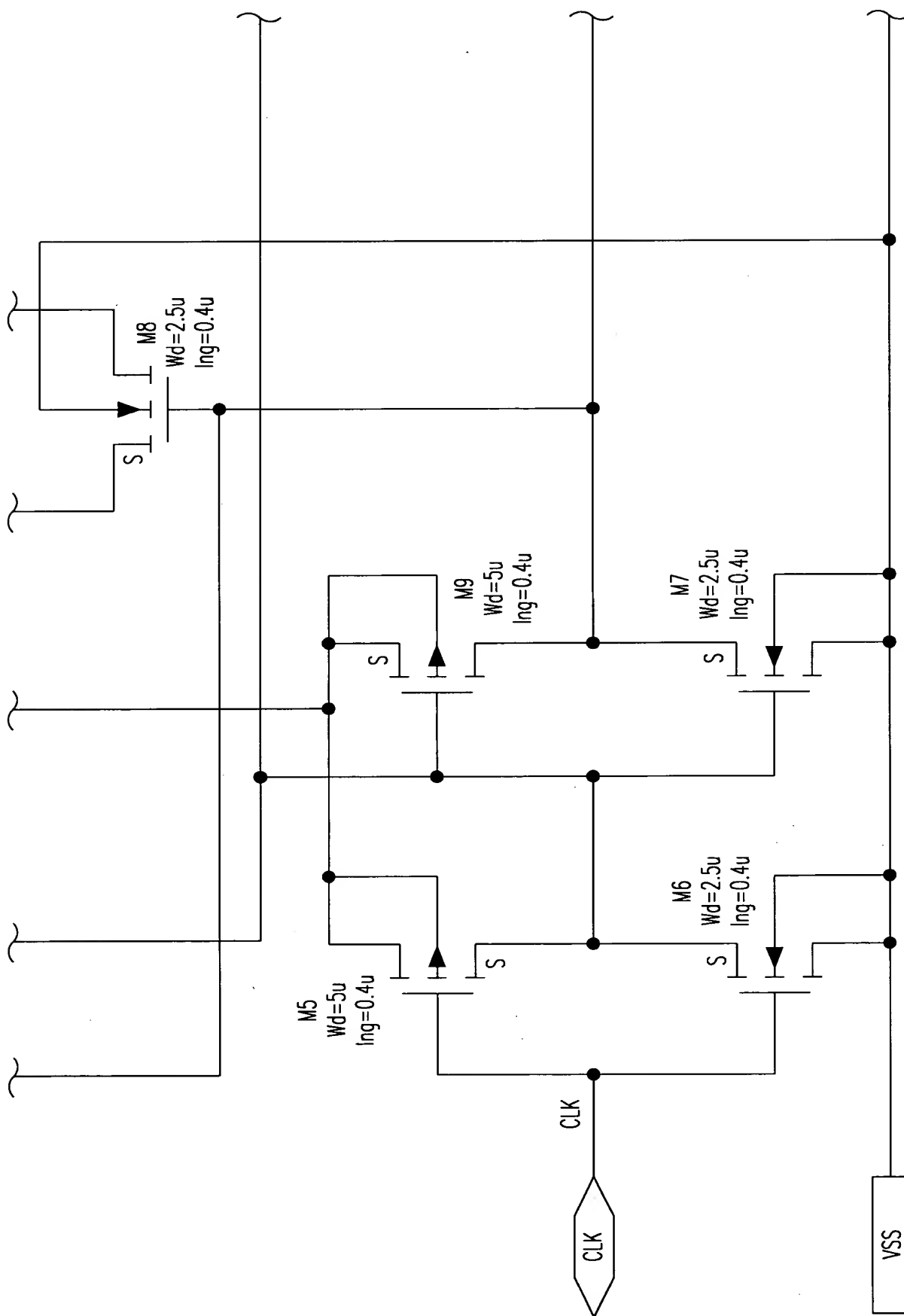


FIG. 159C



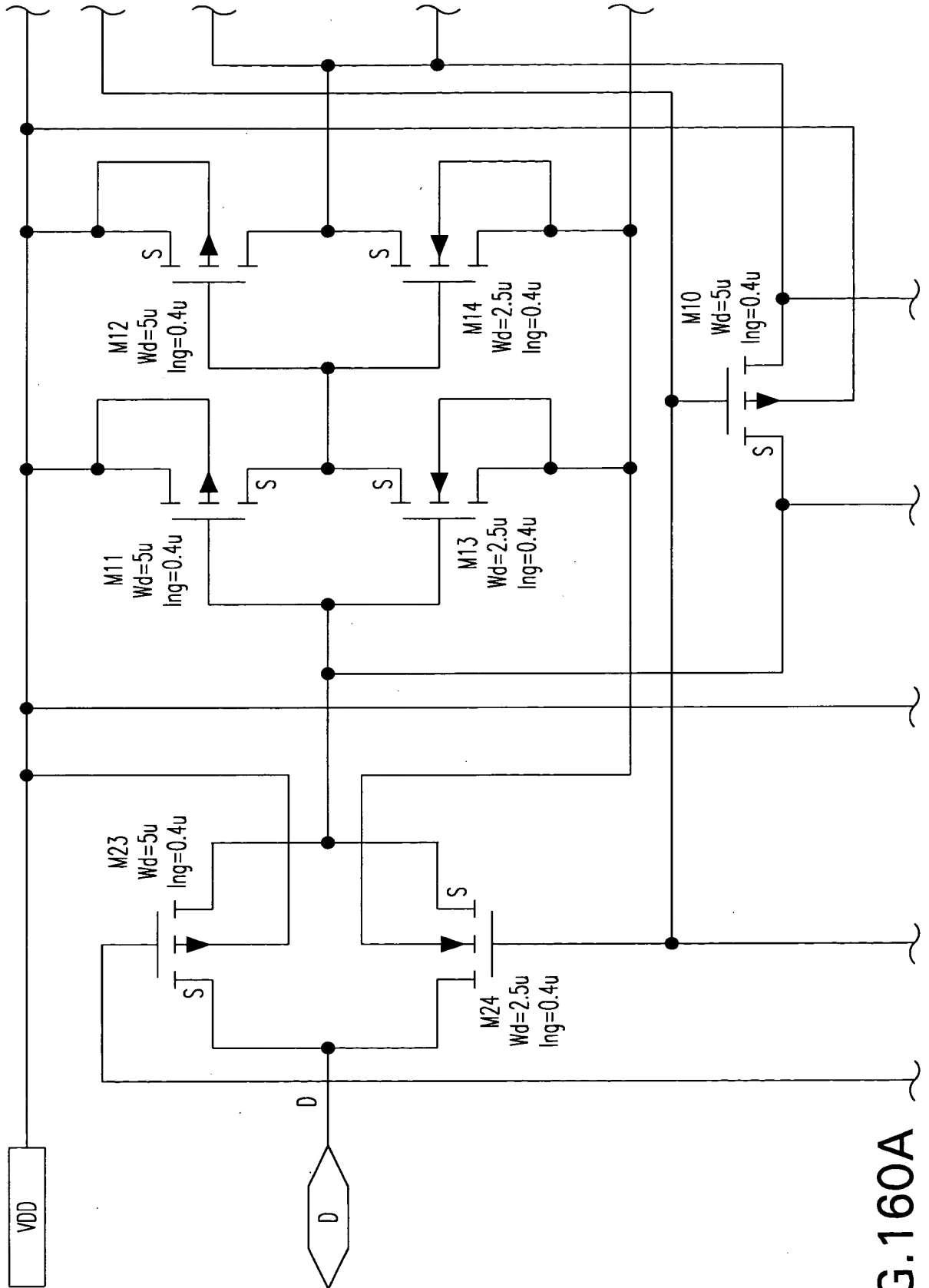


FIG. 160A

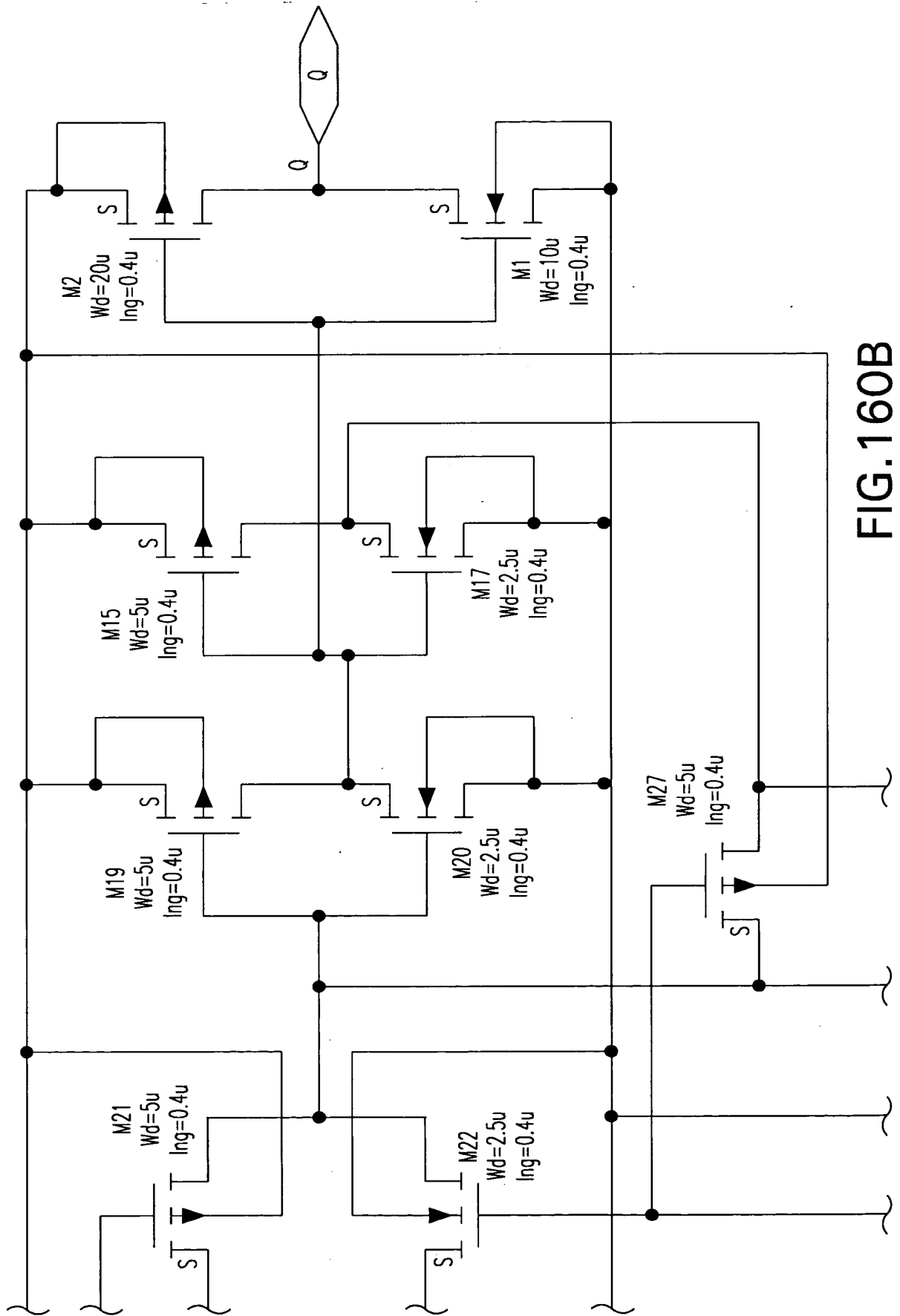
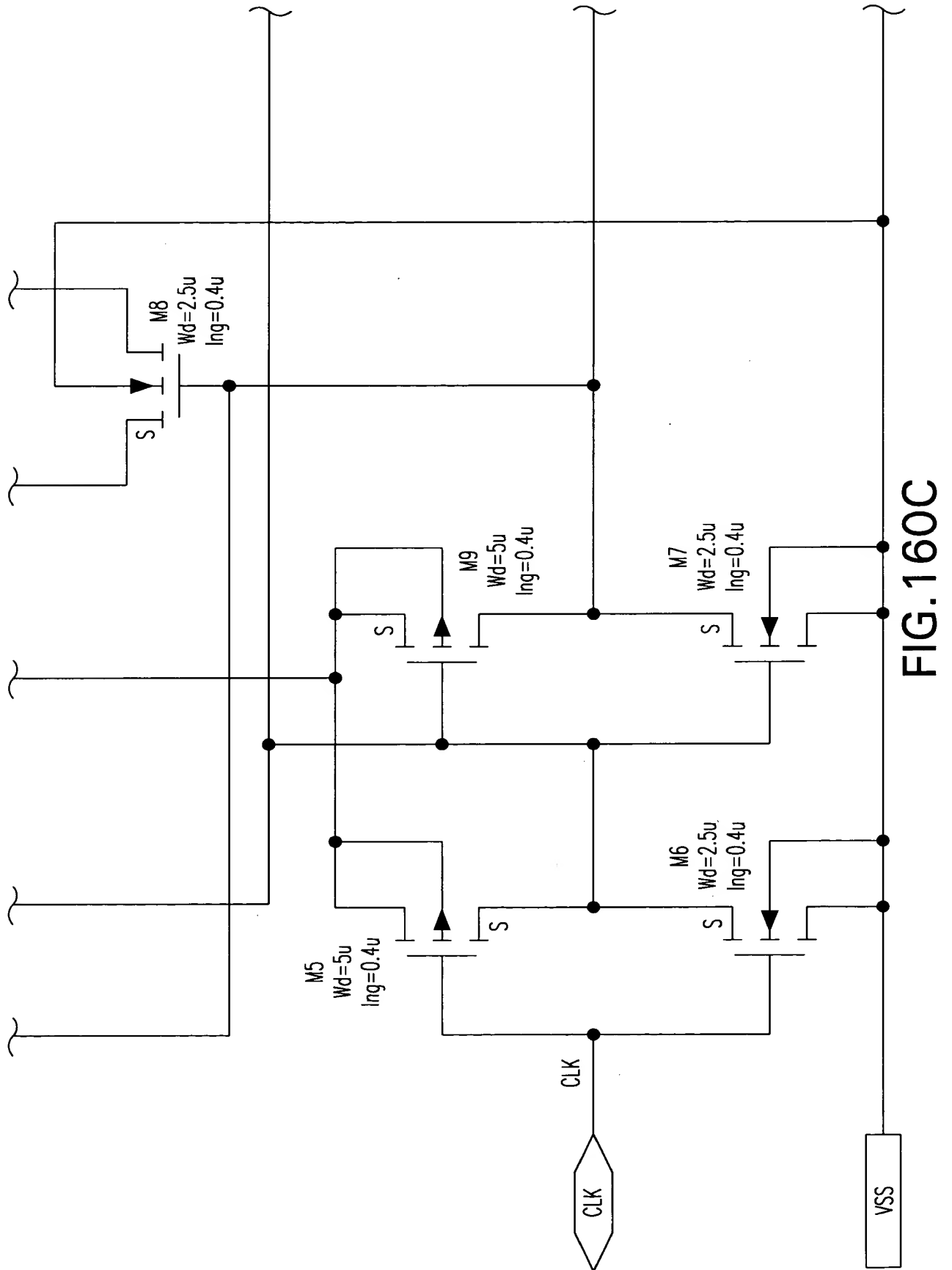


FIG. 160B



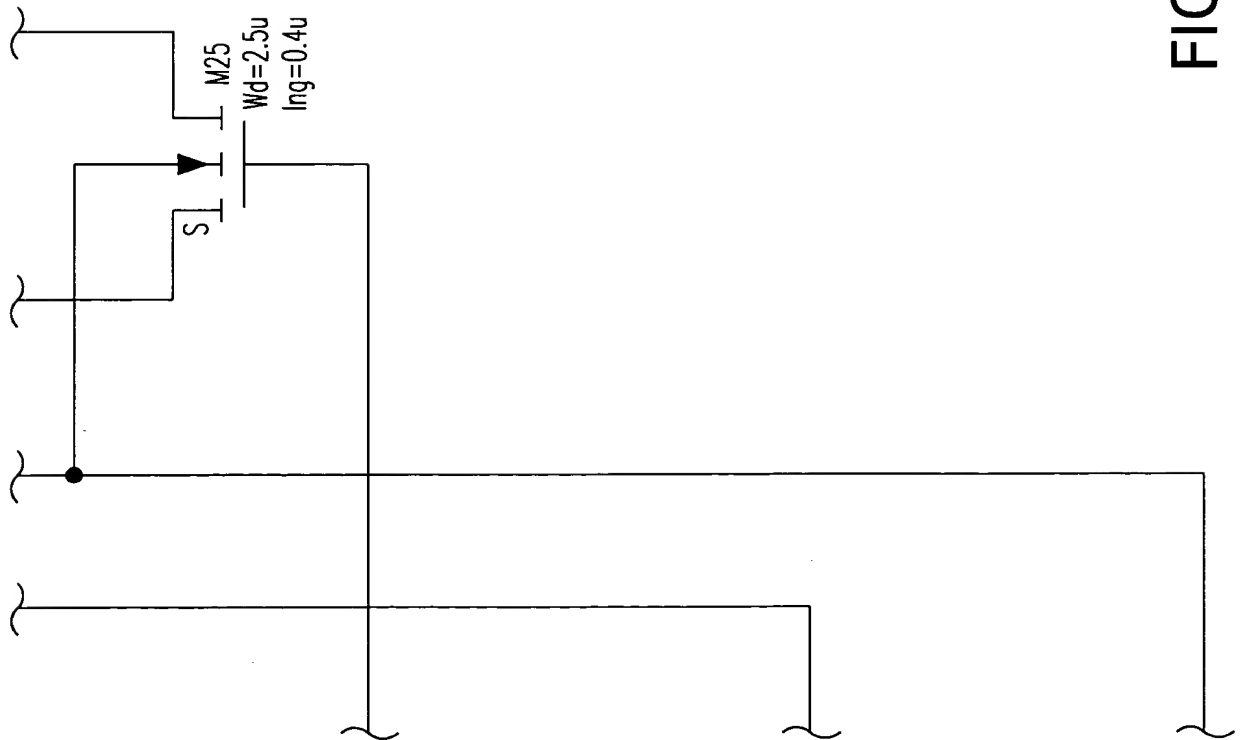


FIG. 160D



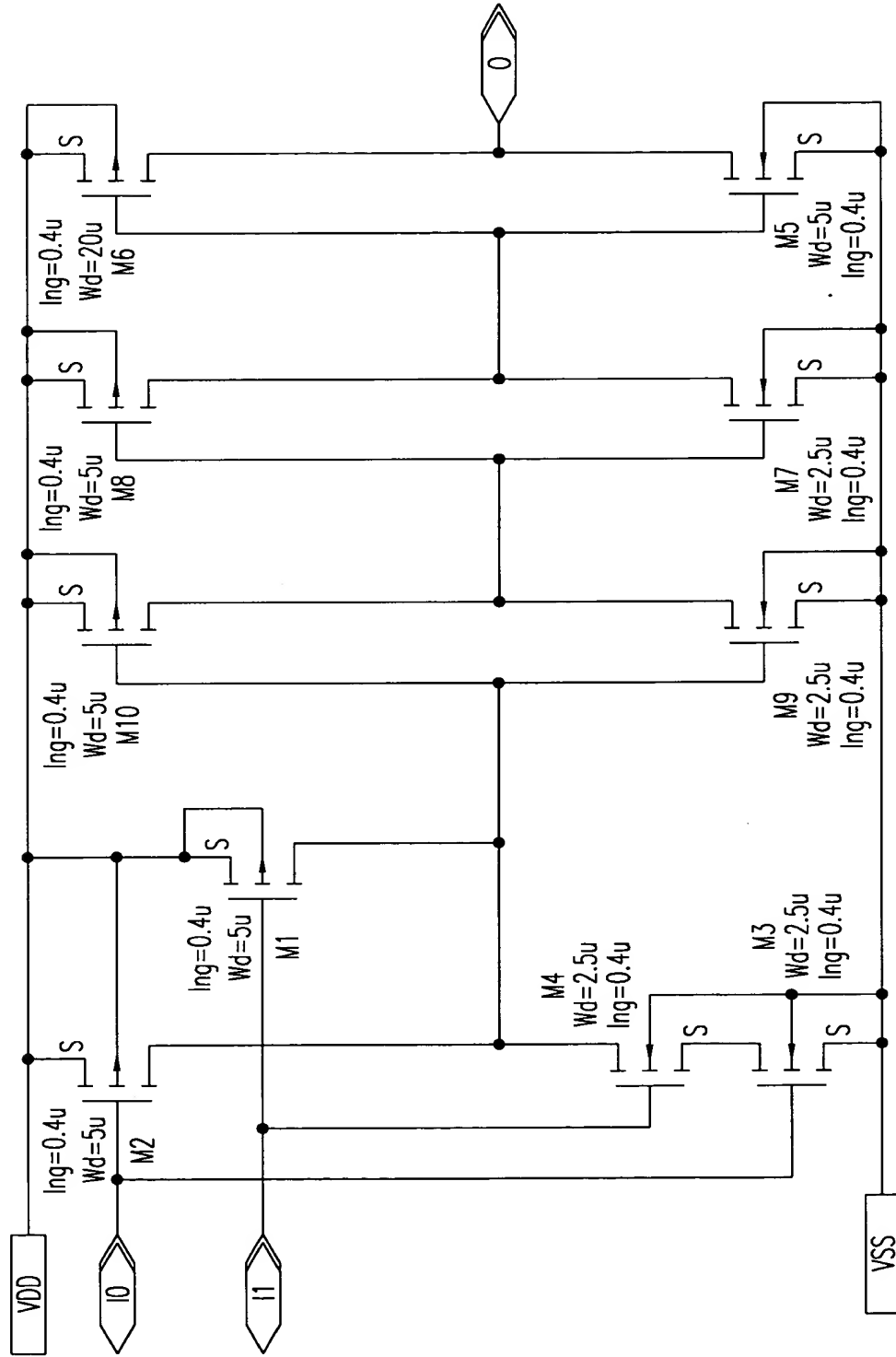


FIG. 161